This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

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Medical Problems of the Accident Commission

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IT IS OUR purpose in this paper briefly and informally to discuss some of the more undesirable forms of treatment which those of us connected with the Accident Commission encounter. Some of the problems which we shall touch upon merit the full attention of a paper of this length. We feel, however, that more will be gained by presenting a number of these sources of bad results than by concentrating upon the full treatment of any one.

First, we should like to spend some time on the shoulder joint, with especial attention to the prevention of stiffness of this important structure. There is little need to dwell upon the anatomy of this joint; suffice it to say that it is capable of the widest range of motion of any in the body and, structurally, in order to permit this free range of motion, it is extremely simple in its bony architecture. In fact, one might state that the shoulder is, in a sense, all motion and no joint, so very limited is its bony configuration. The corollary of extensive freedom of motion and joint structure largely composed of ligaments and tendons is that those influences which limit or interfere with the free gliding of these tissues one upon another, such as inflammation, immobilization, or both, result in a most disastrous loss of motion. Furthermore, no argument is needed to establish the extreme importance to the workman of this full range of motion, inasmuch as the efficiency of the hand is so greatly impaired by limitation of shoulder joint action. The painter and the electrician, as two examples, are practically barred from their occupations if they do not have complete abduction of the shoulder joint. Other such instances are legion.

Though all the motions of the shoulder joint are important, the motion of abduction in the lateral plane is certainly of prime importance. In order that there may be no misunderstanding, we are here speaking of the motion of the arm away from the axis of the body in the lateral or coronal plane to the point where the arm is directly above the body in the so-called pivotal position. There are certain peculiarities of this motion which it is well to bear in mind. In the first place, it is very easily lost and most difficult to regain. It is a fact that in individuals past the fifth decade who are relatively free from signs of arthritic change and who have done heavy manual labor for years, one finds a quite considerable number in whom there is limitation of abduction in the range above the level of the shoulder without any history of past trauma or inflammatory disease. This is mentioned to emphasize the ease with which a portion of this motion of abduction may be lost; so easily, in fact, that in older individuals it often becomes limited spontaneously.

The reason underlying the ease with which abduction, especially in its upper range, is lost is not far to seek and lies in one further peculiarity of the motion of abduction which, though not often appreciated, is fundamental. This is the fact that abduction of the arm in the lateral or coronal plane through the range of this motion which lies above the level of the shoulder is absolutely dependent upon the ability to externally rotate the arm.

This important consideration lends itself readily to demonstration. If the elbow is flexed to a right angle and the arm is internally rotated so that the hand is in contact with the hip, it will be found that abduction begins to weaken about 70° and stops at about 90°. If, now, the arm is placed mid-way between internal and external rotation by flexing the elbow about 90° with the forearm pointed directly forward, abduction will be found to weaken at about 90° and to be impossible much beyond 120°. If, now, the arm is placed in full external rotation, that is with the elbow flexed to 90° and the forearm pointing directly lateral, it will be found that the arm can be put through the complete range of abduction easily and with full muscular power. Thus, internal rotation permits effective abduction to less than 90°, the mid-position between internal and external rotation permits effective abduction to only slightly past 90°, while only full external rotation permits vigorous abduction through the full range of 180°.

It is to be noted that the above applies only to the normal uninjured shoulder. In the old post-traumatic shoulder where abduction is weakened, not only by

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lack of external rotation but also by adhesions and muscle wasting, the motion stops short of the point where weakness is first apparent in the normal joint.

Not only is abduction dependent upon the ability to externally rotate the arm, but, in addition, there is a rough parallel between the two motions; that is, with external rotation of approximately 50%, abduction is possible to approximately 50%. Thus, every degree of external rotation which is restored or preserved, saves not only itself but also a corresponding amount of abduction.

We have, on occasions, seen well-trained physiotherapists who, by various exercises and manipulations, were manfully struggling to increase abduction in a stiff shoulder joint while paying little or no heed to restoring external rotation. Needless to say, such efforts are certain to be attended by dismal failure. If, however, the motion of external rotation is concentrated upon, it will be found, as this motion can be increased, so likewise the motion of abduction increases in like degree. The consummate application of these facts, however, is in the position of fixation to be chosen for the injured shoulder. There is a very lamentable tendency to place the arm in the so-called Velpeau position. This, as you know, consists of placing the arm against the side, the elbow flexed, the forearm extending diagonally across the chest, the arm being so secured by one means or another and allowed to remain there for the entire period of fixation. It is readily seen that this position is one of complete abduction and almost complete internal rotation. Thus, by fixing the arm in full adduction, we have, first of all, paved the way for complete loss of abduction as a result of the inevitable adhesions which follow shoulder injury or immobilization. Then, as if this were not enough, we have further compromised the slender opportunity of ever regaining this motion by also fixing this shoulder in internal rotation. If there was ever an example of adding insult to injury, this is certainly it!

THERE is another position for fixation of the injured shoulder joint, which represents, in a manner of speaking, a compromise between the extremely bad Velpeau and the optimum position of full external rotation and abduction. In this, a spica is applied with the arm abducted to the shoulder level, the elbow flexed to 90° and the forearm parallel to the floor. It is true that this position is more desirable to the patient since the arm is less unwieldy, but if one considers, it is seen that this position is one mid-way between internal and external rotation. Only full external rotation permits complete and vigorous abduction through the full range of 180°.

We feel that the fixation of the injured shoulder allows of no compromise without likewise compromising motion. The optimum position for the fixation of the injured shoulder is abduction to the shoulder level, the elbow flexed to about 90° with the forearm pointing directly upward, this maintained by a plaster shoulder spica. The elbow may be a very few degrees forward of the lateral plane, and, in some older individuals who have a limitation of external rotation, the forearm may have to be inclined a few degrees anteriorly to the exact perpendicular. Retreats, however, from the optimum of 90° lateral abduction, with the forearm vertical, should not be made without a struggle. While it is true that in the young vigorous individual motion will usually return despite improper positioning, it is equally true in the older age group that the losses due to poor position are usually permanent. While departures from the optimum position described above may be indicated for a few days in certain dislocations of the shoulder, these are exceedingly rare and should never be persisted in.

There is another prolific source of shoulder joint stiffness which is the more regrettable inasmuch as here the shoulder joint is not injured at all. We speak of those cases in which, by reason of some injury or infection of the forearm, it is necessary to resort to the use of a sling for a period of time. As a result of this relative immobilization in adduction and internal rotation, shoulder joint stiffness occurs just as certainly, just as extensively and just as permanently, although a bit more slowly, as if the shoulder itself were the seat of the injury. These cases are the more pitiable because the disability could have been so easily prevented. All patients, and especially those in the older age groups, who must resort to the use of a sling, should be emphatically instructed to take the arm out of the sling and for some five or 10 minutes several times each day put the shoulder repeatedly through a complete range of motion, with especial attention to external rotation and abduction; so important does he consider this, that Watson-Jones, speaking of it in the textbook on fractures, lays down the dictum that the patient should be instructed to carry out this shoulder exercise for five minutes of every hour of the day. Certainly the physician who neglects giving his patient this advice runs the risk of finding that when the Colles' fracture he has been treating has healed, perhaps without disability, there is a great disability nonetheless present and this in a joint not even affected by the original injury. Let there be no mistake about the permanency of this stiffness, especially in older individuals. The Commission pays out many hundreds of dollars each year in disability allowances on these shoulder joints which were originally uninjured. Workmen each year lose many months of time while trying to regain motion in these uninjured joints.

WE SHOULD now like to make certain observations in the general field of fracture treatment. Of all the injuries of sufficient severity to cause time loss of more than a few weeks, fractures form by far the greatest part. Those of us who are concerned with final disposal of Accident Commission cases consequently are brought quite forcibly into contact with the end result of numerous examples of the varied forms of fracture treatment. Since the Commission is charged with paying the injured workman monthly time loss until he is able to return to gainful employment, or until his condition has become stationary and then must make an evaluation of his remaining disability, it is axiomatic that we should be keenly aware of ultimate end results.

Open reduction with internal fixation offers at first blush certain rather dazzling possibilities which are very attractive to both physician and patient. The idea of being thus enabled to obtain quickly and accurately permanent reduction of the fragments is very tempting. This consummation is, to many, so desirable that it obscures the dangers and disadvantages. These latter may be grouped under three general headings; first, there is joint stiffness due to the trauma of incision and reduction, even where this is at some distance from the joint involved. Thus, in a fractured mid-shaft of the femur which has been treated by open reduction and internal fixation, we routinely find more limitation of knee joint action than present in the same fracture treated by the closed method. As the site of operation more nearly approaches any given joint, the stiffness is correspondingly greater.

Secondly, open reduction directly results in a larger proportion of non-union and delayed union. An openly reduced fracture heals more slowly and is more apt to fail to heal altogether than is the same fracture treated by the closed method, non-union being, roughly in our experience, about twice as frequent and delay of union being about twice as great in these cases. With the excellent apposition of fragments obtainable by the open method, the above statement may appear exaggerated. The observation is, however, nonetheless true. The explanation of this seeming paradox probably lies in the greater trauma inflicted on the tissues at the sight of the fracture and on the removal of the hematoma surrounding the bone ends, consequent on the open method.

Third, there is the ever-present and generally well-recognized possibility of infection. Strangely enough, this is very often the only contra-indication fully considered by the physician. In our experience, however, it is really the least important, while it is true that when this mischance does occur its results are disastrous. Its occurrence is so rare when compared with the almost universal occurrence of joint stiffness and delayed or non-union that we are inclined to deprecate the importance of this danger, and we especially deprecate the all too common tendency of considering the possibility of infection as being the principle contra-indication to open bone surgery. It is our opinion that, given a series of open reductions with internal fixation, the combined total time loss and permanent disability resulting from joint stiffness and delayed or non-union traceable directly to this method of treatment would be one-hundredfold greater than that resulting from operative infection.

A word should here be said concerning the dangers of operative fatalities. It is true that the open reduction of a large bone, such, for example, as the femur, is accompanied by a very definite degree of surgical shock, especially if the operation is prolonged. This, however, like the danger of sepsis, is generally quite well recognized and evaluated.

While the dangers of surgical fatality and infection in open bone work are real, in general they are well appreciated, and at the risk of treating them too lightly we wish to call attention to these other mal results of open reduction which are, in our experience, more important and far less generally appreciated. When a surgeon bases his decision to do open bone work solely upon his estimate of the dangers of surgery and infection, he is actually weighing less than one-third of the hazards to which his patient is subjected.

Above all, we do not wish to give the impression that we are opposed to all open reductions. This method represents a definite advance in fracture treatment and in certain specialized types of fractures is indispensable. There is, at present, however, too much tendency to resort to open surgery before all of the possibilities of the closed method have been properly tried. In the average simple transverse fracture through the shaft of a long bone, immediate reduction by manipulation, followed by the application of a well-fitted plaster cast, is by far the most desirable form of treatment.

WE SHOULD like now to call attention very briefly to certain well-established procedures which we feel are sometimes neglected. It is often possible when dealing with an early transverse fracture of a long bone which can be reduced, but the reduction cannot be held until the cast is applied, to use a sectional cast with great advantage; thus, the well-fitted cast may be applied distal and proximal to the site of fracture, when sufficiently set reduction can be accomplished and easily maintained for the short period necessary to complete the cast. When this method is used, however, care should be taken to watch for evidence of excess pressure.

The application of a snug cast with little or no padding is definitely more effective than the loose or overpadded cast in which motion of the fragments may effectively prevent or delay union. The cast used for fractures of the forearm should end just proximal to the metacarpophalangeal articulations of the fingers. We encounter much troublesome stiffness of the fingers due to failure to observe this principal. The old rule that the effective fixation of a fracture involves fixation of the joint above and the joint below is still operative. Cutting and wedging of a cast to correct bowing is a simple procedure, too often neglected.

Next to immediate manipulation and reduction, or in those cases where this is not possible, traction holds a very important place in fracture treatment, and there should be no hesitation in the use of skeletal traction when such is indicated. We, personally, feel in cases where adhesive skin traction is undesirable that the Kirschner wire-type of skeletal traction is preferable to the use of large pins, since prolonged drainage from pinholes is rather common.

It is our opinion that the traction method is often neglected in favor of the more dangerous open approach. Traction is very capable of excellent results if patience and care are exercised in its use. When end-to-end apposition has been secured and time allowed for "glueing" of fragments to take place, a cast may then be applied and the more cumbersome apparatus dispensed with. Often when traction has corrected overriding, yet end-to-end apposition has not been obtained, the administration of an anesthetic followed by manipulation of the fragments with the traction still in place will accomplish the result very effectively.

It should never be forgotten that, regardless of the method used, a fracture is the most easily reduced immediately after its occurrence. We fear that too often the feeling that shock may be present or may be produced causes the physician to lose this advantage.

IN CONCLUSION, we wish to make a few remarks about the subject of non-union. In the first place, established non-union, with its rounding and eburnation of bone ends, is a permanent condition which cannot be overcome without surgery. However, delayed union is quite another thing and, although often incorrectly termed non-union, its treatment lies in continued adequate fixation. It should be more generally recognized that identical fractures may heal in quite different periods of time. The usual healing period of any given fracture is only an average and, hence, many exceptions occur. If a fracture has not shown signs of union in the expected time, the physician should not be disturbed and certainly should not label the condition as one of non-union. Much more often it is only delayed union, and resorting to surgery is not only useless, but also harmful. In such cases as these, continuation of proper immobilization until union does occur is sufficient.

This continuation of adequate immobilization is, however, absolutely necessary and cannot be over emphasized. The cast should be scrutinized more closely than ever, and, if it is no longer snug, it should be replaced at once. All too often the opposite takes place. With the onset of delayed union, the physician becomes discouraged, allows a cast which has become

loose to become even looser, and half-heartedly advises the patient to wear it another few weeks. During this additional time, with continued shrinkage of the part, the cast becomes even more inadequate and nonunion is assured. If, however, with the first evidence of delayed union, absolute immobilization of the fragments is obtained and consistently maintained, union will result in the vast majority. Delayed union should be considered a signal to redouble efforts at immobilization rather than to neglect them.

A Report of Four Cases of Aplastic Anemia

—Occurring Among Munitions Workers—

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TRINITROTOLUENE, $C_6H_2CH_3(NO_2)_3$, familiarly known as TNT, is a yellow crystalline substance having high explosive properties. It is manufactured by the trinitration of toluene and is encountered in the munitions industry in the form of dusts and fumes. Absorption into the body occurs by inhalation, ingestion and possibly through the skin.

In World War I in the United States during a 20-months period in one munitions factory 7,000 cases of TNT poisoning were recorded, of which 105 died. In Great Britain during the period from January, 1916, to August, 1917, an estimated number of 50,000 workers were in contact with TNT, of which 1% were fatal.[1]

There have been various case reports of toxic systemic reaction due to this chemical during the present war. Lillie[2] in reporting experiments conducted on rabbits, cats, guinea pigs, and rats describes the pathology of TNT intoxication as a lesion primarily involving the liver. Lawrence[3] reported 495 cases of reactions due to exposure to TNT. Many of these cases were dermatitis. However, this group included 15 cases of serious systemic reaction of which 12 were toxic jaundice and three aplastic anemia. Of this group, all the cases of aplastic anemia expired while three cases of jaundice were fatal.

This report is submitted to present four cases of fatal aplastic anemia which developed following exposure to TNT dust and fumes. Cases No. 3 and No. 4 are very briefly outlined since they have been presented in detail in another publication by DR. JAMES H. EDDY.[4]

Case No. 1

PRESENT ILLNESS: A 50 year old white male, admitted to the hospital October 25, 1943, complaining of shortness of breath, fatigue, and bleeding of the gums. He was in good health until about three weeks previous to admission. At that time he had one tooth extracted following which he bled freely from the gums; two additional teeth were extracted at weekly intervals following which he developed marked bleeding from the gums. At the time of hospitalization the bleeding was continuous. He denied any history of epigastric pain, nausea, vomiting, decreased appetite, or insomnia. He had noted no decrease in weight, and denied having taken medicine of any type.

PAST HISTORY: Negative.

FAMILY HISTORY: Irrelevant.

OCCUPATIONAL HISTORY: Previous Occupation: Farmer. Present Occupation: Melt unit operator (TNT bomb loading plant) since November 14, 1942. He has been employed 11 months and has had no signs or symptoms of ill health as determined by monthly physical examinations. (This examination consists of inspection, record of any significant complaints, pulse, weight, and blood pressure determination, hemoglobin and red blood count.) The patient did not develop dermatitis upon initial exposure as experienced by most new explosive workers.

ENVIRONMENTAL STUDIES: An Industrial Hygiene Team of the U. S. Public Health Service made the following report of findings in the environment of the melt unit operated by the patient in April, 1943: "The exhaust ventilation for the melt unit .... (the unit operated by the patient) is not functioning properly. Air velocity measurements made at the face of the melt units with one of the two charging doors open is 20 and 30 f.p.m. (feet per minute). Atmospheric samples taken at the workers breathing level in front of the melt unit showed TNT present in the amount of 3.7 mg./m.^{3}. This is in excess of the maximum permissible limit of 1.5 mg./m.^{3}" (milligrams per cubic meter of air).

December, 1943, shortly after this patient became ill, Captain F. J. Vintinner, of the Occupational Health Section, Eighth Service Command, conducted a detailed survey at this plant. The findings at the melt unit where the patient had been employed revealed the air velocity at the face of the opening of the melt unit hoods to be adequate. Atmospheric tests taken at the breathing level of the operators while charging the melt unit shows a concentration of TNT in the air to be 10.7 mg./m.^{3}.

PRE-EMPLOYMENT PHYSICAL EXAMINATION: At the time of employment this man was found to be in good physical condition with the exception of myopia, marked pyorrhea, definite apical abscesses of his teeth and hypertrophic tonsilitis.

PERIODIC PHYSICAL EXAMINATION: Each monthly examination revealed the patient to have a normal blood picture until May, 1943, at which time his hemoglobin was 14 grams (80%), and the red blood count was 3,860,000. At this time the patient had no complaints. On September 28, 1943, the hemoglobin examination showed 14 grams (80%), and red blood count 4,000,000. On October 25, 1943, the patient had a marked pallor but had no complaints, his hemoglobin was 6.5 grams (37%), and red blood count 1,840,000. The patient had had two teeth extracted previous to this examination and following the extractions he had considerable bleeding.

PHYSICAL FINDINGS AT TIME OF HOSPITALIZATION: The patient appears to be in good physical condition except for marked pallor of the skin and mucous membranes. A blood tinged secretion is noted on the nasal mucosa. There is poor oral hygiene. Bleeding is present from three sockets where teeth have recently been extracted. There are no other significant physical findings.

LABORATORY FINDINGS: *Pre-employment*:

Urine—negative. Blood—hemoglobin 18 grams (103%); red blood count 5,010,000. Wassermann—negative.

Upon Hospital Admission at Onset of Present Illness:

Urinalysis: Negative except for a positive Webster test which indicates TNT exposure and absorption. Blood: Hemoglobin—6.5 grams (37%); red blood count—1,840,000; white blood count—4,400; lymphocyte—73; polymorphonuclear—27 (stabs. 6, segmenters 21); platelet count—41,000; Kahn—negative; icterus index—6.4; color index—1.8; coagulation time —4.5 minutes.

A blood smear showed marked poikilocytosis, aniso-

cytosis and microcytosis. There were no polychromatic erythroblasts. It was noted that the patient's blood cells rapidly crenated in his own blood serum. This phenomenon also occurred when the patient's cells were matched with typed blood serum.

TREATMENT AND CLINICAL COURSE: The patient was hospitalized October 26, 1943, and the following treatment was started:

1. High CHO diet.
2. Oral administration of concentrated liver and iron and multiple vitamin capsules.
3. Repeated whole blood and plasma infusions; 4900 cc. whole blood and 1500 cc. plasma were given during 60 days of hospitalization.

Ten days after this therapy was started the patient had a slight remission which lasted only a few days. Following this the symptoms became markedly exaggerated, he became progressively weaker, failed to respond to symptomatic therapy, and expired on January 2, 1944, 90 days after the onset of the disease and 68 days after admission to the hospital.

AUTOPSY: The positive findings are outlined as follows:

PERITONEAL CAVITY: *Liver*: Gross: This organ is normal in size; weight 1,859.8 grams; the surface is smooth and normal in color, except for a localized discolored area on the posterior surface which is subcapsular superficial congestion and does not extend into the parenchyma. The biliary system shows no gross pathology. The cut surface of the liver shows no pathology. Microscopic: There is fatty necrosis and hypostatic congestion.

Spleen: Gross: The spleen weighs 170.17 grams. It is small; the capsule is wrinkled and the surface is rough. There are numerous discolored areas over the surface of this organ. Cut sections of the discolored areas of the spleen show these to be hemorrhagic degenerative areas varying in size from two to three millimeters to a large central area of hemorrhagic degeneration about two centimeters in diameter. Microscopic: Hemorrhagic infarction is present.

Lungs: There is marked hypostatic congestion present.

Bone Marrow: A section of the sternum was removed for bone marrow study. Microscopic study reveals myelophthisic anemia. There is complete agranulocytosis of the marrow. There are no erythroblasts present and no evidence of blood regeneration.

FINAL DIAGNOSIS: Acute aplastic anemia, due to exposure to trinitrotoluene.

Case No. 2

PRESENT ILLNESS: The patient was first seen December 6, 1943. He had not worked since November 19, 1943, because of weakness, bleeding from the gums, and anorexia. He had hematemesis on several occasions during the previous two weeks. He had been working in TNT since July 22, 1943, in a melt load building where he screwed base plugs in fragmentation bombs. He emphasized the fact that he felt perfectly well until two weeks ago and had not reported his illness earlier because he saw no connection between it and his work at the plant. Further questioning revealed that the patient had lost 12 pounds in the past six months. He denied having taken any medication.

PAST HISTORY: The past history was essentially negative.

FAMILY HISTORY: Negative.

OCCUPATIONAL HISTORY: The patient has never previously been employed in an occupation offering a health hazard.

Present Occupation: The patient was first employed in this munitions (TNT) loading plant on April 7, 1943. The first operation in which the patient became engaged and the one in which he worked from August 9, 1943, until the onset of his present illness, November 19, 1943, was pouring molten TNT and tightening adapter plugs in 105 mm. fragmentation bombs.

ENVIRONMENTAL STUDIES: Air studies conducted December 1, 1943, revealed atmospheric concentrations of TNT in the room in which the patient was working to be 4.2 mg./m.^{3}.

PRE-EMPLOYMENT PHYSICAL EXAMINATION: He was a well developed, apparently normal, white male. There was no evidence of pallor, cyanosis, or skin disease. Examination of the mouth revealed a partial denture and two carious teeth.

PERIODIC PHYSICAL EXAMINATION: From the time of employment on April 7, 1943, until July 22, 1943, the patient was not exposed to TNT and therefore he did not submit to periodic physical examinations.

The first periodic physical examination was given on August 19, 1943, one month after exposure to TNT began. It is summarized as follows: Urine—negative; hemoglobin—15.5 grams (87%); Foulger index—0.7; blood pressure—116/72. The patient had no weight changes and no subjective complaints.

September 17, 1943: Hemoglobin—13.9 grams (80%); blood pressure—128/76; Foulger index—0.6. There were no subjective complaints.

October 6, 1943: Urine—negative; hemoglobin—13.5 grams (76%); blood pressure 120/80; Foulger index—0.85. There were no subjective complaints.

October 27, 1943: Urine—negative; hemoglobin—12.35 grams (70%); blood pressure—118/80; Foulger index—0.7; and no subjective complaints.

PHYSICAL EXAMINATION AT TIME OF HOSPITALIZATION: Except for moderate cervical adenopathy, slight cyanosis, and marked pallor of the skin and mucous membranes, the physical examination is negative.

LABORATORY: *Pre-employment Laboratory Findings*: Urine—negative; hemoglobin—14.5 grams (84%); Wassermann—negative.

Laboratory Findings Upon Admission to Hospital: Urine—negative except for occasional WBC/H.P.F. Blood: Hemoglobin—2.5 grams (23%); red blood count—1,090,000; white blood count—2,600; polymorphonuclear—10; lymphocytes—86; monocytes—3; platelets—24,000 per cu. mm.; eosinophils—1%; icterus index—7.8; bleeding time—2 minutes 3 seconds; coagulation—5 minutes 15 seconds. Following transfusions of large amounts of blood (2900 cc. in three days) the red blood count became elevated (2,660,000), and hemoglobin reached 7 grams (42%). However, the white blood cells failed to show this upward trend (total white 1,400, polymorphonuclear 3. The platelet count gradually decreased to 6,000 per cu. mm. Bone Marrow—There is a reduction of the total number of myeloid elements. Fat vacuoles are prominent. Granulocytes are markedly reduced in number. Erythoblasts and normoblasts are sparsely found and irregularly distributed in small darkly stained clumps.

TREATMENT AND CLINICAL COURSE: The treatment is outlined as follows:

1. Complete cleansing of the body to remove any remaining TNT.
2. Cleansing and irrigation of the oral cavity and pharynx.
3. High caloric, well balanced diet.
4. Mild laxative to insure adequate elimination.
5. Supportive therapeutic measures consisting of:

(a) Whole blood transfusions (a total of 5900 cc.

of blood were given in during the 19 days of hospitalization, 2900 cc. of which were given in a three day period).

(b) Intra-muscular liver and iron; vitamin C and K.

(c) Proteolac in conjunction with liver extract was given in an attempt to stimulate hematopoiesis.

In spite of these measures the patient's course was steadily downward. The bleeding from the mouth continued, and increased in severity following transfusions of large amounts of blood. He also developed hematuria following transfusions. Profuse terminal oral bleeding developed. The patient expired December 25, 1943, 35 days after the onset of his illness and 19 days after admission to the hospital.

FINAL DIAGNOSIS: Acute aplastic anemia due to TNT intoxication.

Case No. 3

PRESENT ILLNESS: The patient, a 50 year old white male, reported to the hospital because of the presence of small purplish spots over his lower extremities. For two days prior to reporting he felt weak but did not have any other symptoms. There was no history of medication of any type. A hemoglobin determination taken two days before the onset of the present illness was 12 grams. He had no complaints at that time.

PAST AND FAMILY HISTORY: The past and family histories were negative. There is no history of self medication of any type.

OCCUPATIONAL HISTORY: The patient previously had always been a farmer. He was employed in this munition plant as a janitor to sweep and clean the floors in bays where bombs were cooled and where some puddling (working cold TNT scrap into hot bombs) was done. TNT concentration tests made in the workroom atmosphere where the patient was employed had been found to range between 1.1 and 7 mg./m.^{3}. He did not develop TNT dermatitis and did not have any complaints until the onset of his fatal illness. He became ill after being employed only six weeks.

PHYSICAL FINDINGS AT TIME OF HOSPITALIZATION: Examination upon hospital admission revealed a normal male except for numerous petechea over both lower extremities. There was an occasional hemorrhagic lesion on the abdomen, chest, and upper extremities. The skin of the right arm showed two large (6 x 8 cm.) bluish areas of discoloration.

LABORATORY FINDINGS: Urine—negative. Blood—red blood count, 3,410,000; hemoglobin, 10 grams; white blood count, 3,800; polymorphonuclear, 26; lymphocytes, 70.

Bone Marrow—Study of the sternal bone marrow made early in the hospital course showed an almost acellulur marrow with tremendous increase in the fat spaces and increase in the pink staining intercellular material. Few, if any, adult cells were seen. This substantiated a diagnosis of refractory anemia with hypocellular, immature marrow.

TREATMENT AND CLINICAL COURSE: The patient received 3,150 cc. of fresh whole blood and the concentrated cellular element from 2,500 cc. of fresh blood during a 10-day treatment period before he expired. At this time the red blood count was 4,480,000; hemoglobin, 16.1 grams; white blood count, 200; polymorphonuclear, 2; lymphocytes, 98.

The patient developed ulceration of the pharynx, melena, hematuria, pulmonary congestion and expired ten days after admission to the hospital.

DIAGNOSIS: Acute aplastic anemia, secondary to exposure to TNT dust and fumes.

Case No. 4

PRESENT ILLNESS: A 55 year old white male was admitted to the hospital complaining of weakness, sore throat, fatigue and loss of weight. These complaints followed a severe chronic cold of one month's duration.

PAST AND FAMILY HISTORY: The past and family histories were negative. There is no history of self medication of any type.

OCCUPATIONAL HISTORY: The patient had been employed four months as a "puddler" in bomb filling operations. This job consisted of adding scrap TNT to partially filled bombs. Results of air tests showed the concentration of TNT in the air at the breathing level of the operator to be from 5.3 to 7 mg./m.^{3}. This employee had been using the usual precautionary measures including the use of a dust respirator. About 30 days after initial exposure to TNT he developed TNT rash.

PHYSICAL FINDINGS AT TIME OF HOSPITALIZATION: Examination revealed a white male with marked pallor. There were numerous petechea over the legs and body. There were a few small hemorrhagic areas in the oral mucous membrane, one of which was ulcerated. There was a small ulceration in the left tonsillar fossa.

LABORATORY FINDINGS: Laboratory findings upon admission to the hospital were as follows: Urine—negative. Blood—red blood count, 3,800,000; white blood count, 3,200; hemoglobin, 24 grams; polymorphonuclear, 8; lymphocytes, 92; platelets, 160,000.

Bone Marrow—A bone marrow biopsy was reported to show typical changes of aplastic anemia. The findings were essentially the same as those for Case No. 3.

TREATMENT AND CLINICAL COURSE: The patient's course was progressively downward. In spite of large whole blood transfusions the red count never exceeded 3,000,000 and during the final two months the count was 1,000,000 or less. The white count showed an interesting fluctuation incident to a gluteal abscess which developed following an intramuscular injection. The total count rose from a level of 900 to a peak of 3,600 at the time of drainage of this abscess. The polymorphonuclear count showed a similar change. This count elevated from 23 to a total of 78 at time of drainage. The total white count and granular cells gradually declined after this episode. The platelets showed a steady decrease from 160,000 to 17,000. The patient developed a profuse gastric hemorrhage and expired seven months following the onset of the illness.

DIAGNOSIS: Aplastic anemia, secondary, due to exposure to toxic chemical.

IN GENERAL the symptomatology, laboratory findings, and clinical course as presented by these four cases is very similar. Skin sensitivity to TNT, a common finding among munition workers, occurred in only one case (No. 4). In contrast to benzol and other chemicals which commonly cause aplastic anemia, these cases developed leukopenia only after the disease, as evidenced by a reduction of hemoglobin and red blood count, was well established.

A point of significance is the fact that each of these cases was employed on a job where the exposure to TNT occurred after the chemical had been remelted and was in the process of resolidifying. In munitions plants a greater number of the operations offer exposure to TNT in the remelted state. The screening operation, where TNT is handled prior to remelting, is a source of constant and excessive concentration of the dust in the workroom atmosphere. Nevertheless, relatively few mild, and no serious, systemic toxic reactions have been encountered in this operation.

Mild toxic jaundice was the leading cause of illness due to exposure to TNT during World War I. The majority of cases of TNT intoxication reported in literature during the present war have been hepatic in origin. In this area (Texas, Oklahoma, Louisiana, Arkansas, New Mexico) there have been only three cases of jaundice reported due to exposure to TNT in munitions plants. It is significant that all early cases of apparent toxicity requiring transfer from exposure to TNT are manifest by early mild secondary anemia. Liver function tests, namely the cephalin cholesterol flocculation test and urobilinogen test, have been conducted, but greater importance is still attached to the blood picture of exposed employees than any other test yet devised.

Summary

FOUR cases of fatal aplastic anemia due to exposure to TNT are presented. The clinical courses of these cases are very similar.

2. Each employee developing this condition was engaged in an operation where exposure was to TNT which had been remelted and was in the process of resolidifying.

3. The most dependable laboratory finding indicative of toxic reaction, so far encountered, is the reduction in the hemoglobin and red blood count.

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Occupational Dermatitis

—In the Food Industry—

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ON SUPERFICIAL thought one is not apt to regard food production as a war industry, but upon deeper consideration it is realized that the production, processing and preservation of food is one of the most important and essential of our war industries. Not only "the Army marches on its stomach," but the well being, efficiency and morale of our home war workers depends on the food industries. Therefore, it is of the utmost importance to see that the workers engaged in the production, processing, and preservation of food are kept "on the job" by protecting them from the health hazards connected with their work. In order to do this it is necessary to find what the health hazards are. In our studies we have found that dermatitis constitutes by far the largest percentage of all industrial diseases in our food industries.

The statement that "one man's meat is another man's poison," is nowhere better illustrated than in our food industry. We will not talk about those who are allergic to eating certain food and develop urticarial types of rashes or angioneurotic edema from eating fish, strawberries, tomatoes, mangos, etc. We will consider only food handlers who develop contact dermatitis from handling foods.

Occupational dermatitis has been reported as occurring in almost every one of the food industries including meat, fish, pastry, candy, fruit, and vegetables.

Presented before the Food Section of the National Safety Council, Chicago, October 5, 1944.

Meat

IN MEAT packing, occupational dermatitis usually occurs from handling the carcasses of diseased cattle.

In slaughter houses erysipeloid is not of infrequent occurrence among those handling the carcasses of diseased swine. It is caused by infection with the bacillus of swine erysipelas.

"Hog itch" is another occupational disease occurring among those who handle the intestines of hogs infected with roundworms. It is caused by a sensitization to the secretions of the roundworms.

A peculiar erosion of the nails is seen among workers extracting the pancreas or sweetbread from the carcasses. This is caused by the digestive action of the pancreatic enzyme on the nails. The nails are eroded and have a moth-eaten appearance. They soon regenerate after contact with pancreatic juice ceases.

An atypical form of variola can be contracted from sheep suffering with sheep pox.

Butcher's pemphigus, an acute febrile disease following cuts or abrasions, is a rare disease.

Other diseases of rather infrequent occurrence occurring in those who handle meat are anthrax, brucella eruption, foot and mouth diseases, actinomycosis, tularemia from rabbits, and verruca necrogenica contracted from handling tuberculous cattle.

Fish

OCCUPATIONAL dermatitis is quite frequent among fishermen. It is known among them as "fish poisoning." The term covers a multitude of conditions:

1. Erysipeloid which results usually from puncture wounds of the hand inflicted by the sharp fins and bones of red fish. The Rose fish, a variety of rock cod, is the fish causing most erysipeloid in Massachusetts.

2. Red feed poisoning. Dermatitis occurs in the handling of mackerel and is caused principally by remains in the stomach of a small crustacean known as "red feed." The acid juices of the mackerel's stomach are so strong when it contains red feed that after the mackerel is dead the juices will eat through not only the walls of the stomach but even through the flesh of the mackerel itself. Red feed dermatitis is caused by these strongly acid juices.

3. Durry poisoning. There are other infections of the skin of fishermen all classified under the name of "Durry poisoning." Durry is the name given to all those parts of the fish which are not used for food, i.e., the scales, the intestines, the head, the tail, and the fins.

4. "Pigeon" is the name given to an infection occurring around the wrists or necks of fishermen. It is caused by friction of the sleeves or collars of the rubber coat with subsequent infection.

In salting and curing fish, dermatitis may occur from salt and brine.

Fishermen are also subject to bites from venomous fish such as the dogfish, catfish, etc.

Milk

WORKERS in dairies sometimes develop a condition known as "milk nodes" which are callosities on the fingers and palms of the hands due to milking. Milker's warts which may be due to handling tuberculous udders also occasionally occur among dairy workers.

While no dermatitis has been reported from milk itself, dermatitis does occur among workers who handle

cheese. It is due to a small maggot "Tyroglyphus longior." This condition affects the hands, the forearms, and interdigital spaces.

Fruits

DERMATITIS occurs among people picking and packing fresh fruit, as well as among those canning fruit.

In the citrus fruit industry dermatitis occurs from the irritant oil in the rind of lemons, oranges, limes, and grapefruit. The chief ingredient of this oil is limonene. Among those who pick citrus fruit, dermatitis may occur from the thorns on citrus trees and from the insecticides and fungicides sprayed on the trees. Paronychia is not uncommon among the canners of citrus and other fruit.

Peaches have often caused dermatitis both among those who pick them because of the sharp fuzz on many varieties, and on those who can them. The canners develop dermatitis from the juice of the peach which contains much sugar and is hydroscopic and irritating to the skin.

Dermatitis has been reported from the cyanide insecticides used on grapes.

The milky sap from the stem of the fig causes a photosensitization dermatitis.

Those peeling the pineapple often develop dermatitis from the sharp spears on the pineapple as well as from the high content of sugar in the juice.

Dried Fruits

DERMATITIS occurs from dried fruits and is often the cause of "grocer's itch." Dried dates, prunes, figs, apples, and pears, sometimes are infested with mites known as carpoglyphus passularum and glycyphagus domesticus.

Tea leaves sometimes are infested with a mite known as rhizoglyphus parasiticus, and wheat may contain a mite known as aleurobius farinae.

Nuts

DERMATITIS has been reported among those handling dried coconuts or copra. Copra is sometimes infested by a large beetle which irritates the skin of workers loading and unloading it from ships.

Brazilian nuts have been reported to cause dermatitis and so has peanut oil.

Vegetables

DERMATITIS occurs in the handling and canning of practically all kinds of vegetables.

Workers picking lettuce are said to develop dermatitis from the milk sap coming from the butt of the lettuce.

Artichokes, carrots, celery, corn, garlic, mint, parsley, parsnips, potatoes and tomatoes have all been reported as having caused occupational dermatitis, especially in canneries where these vegetables are peeled, cut, dried, and where their juices have an opportunity to stay in contact with the skin for a considerable length of time.

Bread and Cake

DERMATITIS occurs among the makers and handlers of flour. Allergy may be developed towards the bleaches and persulfates used to bleach the flour. Most of such cases have been reported from Europe. A few cases of dermatitis have been reported from allergy to the wheat itself.

Dermatitis has been reported from the flavoring agents used in cakes. Cinnamon and vanilla have been the chief offenders.

Candy

DERMATITIS has occurred among those engaged in making candy. Certain types of chocolate will cause allergic dermatitis. Cinnamon and oil of cassia cause allergic dermatitis in certain candy makers. Sugar has a dehydrating effect on the skin and may cause dermatitis.

Pickling

IN MAKING pickles many irritant substances are used. Acetic acid, strong brine, pepper, are some of these. In the fermentation of pickling, lactic acid is formed and this can cause dermatitis even in dilute solutions.

The sugar used in making sweet pickles may dehydrate the skin.

In addition to dermatitis from the articles of food themselves, dermatitis has occurred from the resin lining of certain types of tin cans. The ordinary tin lining of a tin can discolors some types of foods such as maraschino cherries, and therefore the cans used for holding such substances are lined with a resin lining. The workers handling the cans come in contact with flakes of resin coming off the lining and may develop a sensitization dermatitis.

Prevention

THE prevention of dermatitis in the food industry is very simple. In addition to the enforcement of personal and environmental cleanliness it consists of food handlers wearing rubber gloves, impervious sleeves fastened over the gloves at the wrists, and impervious aprons. Not only does this type of protective clothing protect the worker from contact with the materials which are handled but it also protects the materials from contamination. Protective clothing of this type should be furnished to all food handlers. It should be furnished clean daily to them and should be kept in repair by the management.

Mouth Infection and Industrial Health

—A Mouth-Health Program for Industry—

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ONE of the first authentic records of the recognition of the role of mouth infection as a cause of disease of other structures of the body was found on a cuneiform tablet, unearthed in the ruins of the Biblical city of Ninevah in ancient Assyria and made 2600 years ago. On it was written the following diagnosis of the cause of a certain systemic disease and a prescription for its treatment: "The burning which burns his head, his hands and his feet is on account of his teeth. Let his teeth be extracted from his face."

There is no record of the prevalence, in those days, of infection of the teeth, jaws, and adjoining structures, but today we have statistics from various sources that emphasize mouth infection as the most widespread scourge of humanity, a scourge that, in addition to its local destructive effects, is a major cause of disease in practically every organ and structure of the body.

Most types of disease which originate in other structures of the body also occur in the mouth or have mouth manifestations. In a paper written in 1916,[1] I named over 75 such diseases and pointed to the fact that in a large percentage the pathologic change in the mouth is the first indication of such disease. This is especially true of metal poisoning and other occupational diseases. Superimposed

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on these mouth manifestations as a consequence of the lowered resistance of such involved tissue, mouth infection is an almost invariable complication.

In addition to mouth infection from such a source, and in far greater proportions, we have the almost unbelievably high incidence of infection from local diseases peculiar to the specialized anatomy of the teeth, gums, jaws and associated structures. I will mention here only caries (decay of the teeth) and so-called pyorrhea.

Decayed teeth, if not properly repaired, follow their natural course of death to the pulp (nerve) and abscess formation with resulting disease of the jaw around the ends of the roots, and in many cases more serious extension of disease. Because of the previously widespread practice of dentists treating and "saving" dead teeth, many of these are found in the employee and, even though the x-ray shows no bone destruction, microscopical examination reveals that practically all are infected.

Pyorrhea is a convenient all-inclusive name given by dentists to the gamut of infections that develop in the gum tissues from various causes and spread to the bone and adjoining structures.

From these local infections in the mouth, bacteria and their toxins are continuously seeping into the blood-stream to be carried to every organ and structure and thus disease can result anywhere and everywhere in the body. Further discussion of the serious effects will follow later.

As consultant in mouth-health and oral surgery to the Chicago Rapid Transit and other companies, my records show that approximately 98% of employees examined harbored mouth infection. Most of these employees' mouths were supposed to be healthy, neither their dentists nor they having appreciated the significance of the so-called "dead" teeth, gum infections, or other diseases that were not causing pain or discomfort. This high incidence of mouth-disease applied to executives as well as to labor.

These statistics bring to mind that in 1919 Dr. Charles H. Mayo[2] quoted William Block as saying that one-fourth of us have septic mouths at 25 years of age, at 45 nearly 90% are septic, and after 50 practically all mouths are septic.

Long before World War I, the alarming proportions and serious effects of mouth infection were impressed on the professions and the public; yet in that war draft rejections from *local* mouth conditions were higher than from any other cause, even though the requirements were entirely adequate from a health standpoint.

In World War II, draft rejections from *local* mouth conditions are still higher than from any other cause, even after, as one man has said, "Selective Service has relegated mouth-health standards to the rubbish heap."

I speak of mouth infection here instead of infected teeth because, although infection may start in the teeth, the serious aspect is the disease that has spread from the teeth to the adjacent bone and other mouth structures. If I referred to teeth, one would assume that removal of teeth would eliminate all the infection. But that is not the case unless at the same time all adjoining disease has been eliminated. Statistics reported by the Mayo Clinic show that infection is still present in the jaw in one out of every four places where teeth have been removed, and that one out of every three mouths, with all teeth removed, still harbors infection. These percentages are substantiated by my own records.

The laity is astounded by statistics of the high incidence of mouth infection, but competent professional men have been aware of this situation for a long time. Regardless of their efforts to enlighten the public and industrial management, there still remains too great an attitude of indifference.

But what has all this to do with industrial health which is concerned with absenteeism, manpower failure, and safety in industry?

The Problem of Manpower Failure

FIRST, let us discuss briefly the enormity of this problem and its relation to general health. This audience of industrial health enthusiasts has most of the appalling statistics at its finger tips, the hundreds of millions of man-days lost and their interpretation in numbers of battleships and bombers that could be built by avoiding various percentages of that loss. I do, however, want to mention a few:

1. In the report of the National Safety Council for the year 1942, the toll of *accidents* for the nation is illustrated by a visualization of a great catastrophe in which every man, woman and child in a city three times the size of Chicago was killed or injured.[3]

2. Wm. A. Irvin, Director, National Safety Council and former president of U. S. Steel Corporation, says accidents are still causing production delays equivalent in the aggregate to a complete shutdown of every industrial plant in the country for a full day each month.[4]

3. The accepted absenteeism figures for sickness alone in normal times are around 400 million industrial man-days lost. National Safety Council figures average eight days lost per man each year; Great Britain averages 10 days.[5]

4. Dr. John R. Steelman, Director, U.S. Conciliation Service, states that man-days lost through sickness and accidents are 100 times more than through strikes.[6]

5. The Office of War Information reports that, in the period from Pearl Harbor to the end of 1943, 7500 more persons were killed in industry than in battle. In addition, 60 times more persons in industry were disabled than the total number wounded and missing in action.[7]

6. Admiral Charles W. Fisher says war plant casualties are as important as war front casualties.[8]

7. Brigadier General Donald Armstrong says the man-hour rate may turn the tide of the whole war.[9]

8. Lester Brown, Area War Manpower Commission Director, states that if we could cut Chicago's absenteeism and turnover by only one-fourth we would have added the equivalent of 30,000 workers to our labor force. It was on the basis of such a shortage that the city was declared a critical labor shortage area on March 1.[10]

Relation to Manpower Failure

NATIONAL Association of Manufacturers, in a recent survey of 1625 companies, employing around 500 each, reports that a health program resulted in a 47% reduction in accidents and occupational disease.[11]

This is commendable publicity for health programs but it is also an illustration of the fact that so much emphasis and publicity have been placed on occupational disease, and especially occupational accidents, that the prevalent impression is that the bulk of the loss of man-hours can be attributed to occupational disabilities. In reality they are *relatively* unimportant. Work-related disability accounts for only a small proportion of all time lost. Non-occupational causes far outweigh the occupational.

Dr. C. D. Selby, Medical Consultant, General Motors, reports that in one survey there was 300 times as much loss from *non-occupational* disease as from occupational, and twice as many *non-occupational* injuries as occupational. He states, "These figures point to one irrefutable fact: that the greatest sources of disability are those with which the public health and the general practice of medicine are concerned".[12]

A survey by the American College of Surgeons revealed that for every day lost due to occupational disease, 59 are lost due to industrial injury and 885 to non-industrial injury and illness.[13]

Joseph H. King, Chairman of Red Cross blood donor service, reports in December, 1942, that in 10 industrial plants rejections of volunteers ranged between 30 and 50%.[14]

A February 12, 1943, news report: Major Lewis B. Hershey, Selective Service Director, appeared at a hearing of the House Military Affairs Committee and stated that, of the 22 million men between 18 and 38, more than 40% are being rejected for physical unfitness.

These statistics are a shocking commentary on the health of the nation. Dr. Roger I. Lee, in a Mayo Foundation lecture, April, 1942, stated: "It is no wonder the situation in regard to health and fitness at 50 is chaotic when there is so much discussion about fitness for military service in the twenties and thirties."[15]

A tabulation by the U. S. Public Health Service showed

more than 11 million latent man-power with chronic diseases.[16]

It would assuredly be a great gain for the nation's man-power if the skilled responsible workers now forced out by illness were enabled to "carry on" by widespread health conservation measures.

Prevention the Logical Solution

INDUSTRY spends untold money and scientific effort to reclaim waste products in industrial activity, but wasted and physically and mentally degenerated manpower, once degenerated, can be reclaimed only to a minor extent. The main problem then is *prevention* of this manpower waste.

Dr. George Piersol, in a paper on the role of the physician in industry, says, "The well known fact should never be lost sight of, that industrial medicine is in fact only a specialized part of the broad domain of public health and hygiene and that the most legitimate and constructive activities of the industrial physician should be exerted in the field of *preventive* medicine."[17]

The Council of the British Medical Association has decided that more emphasis should be laid on the *preventive* aspects of industrial medicine,[18] and the Industrial Health Research Board of the Medical Research Council of Great Britain reports that those who are most often ill tend, on the whole, most often to have accidents, and that *prevention* of accidents may depend to a considerable degree on the *prevention* of sickness.[19]

In case it may be thought that medical conservation of the health of employees, especially in its preventive phases, is some new fad, I shall quote at random from a published article on "Industrial Health and Welfare" which I wrote in 1917 (over 25 years ago).[20]

"The duty and the obligation of the corporation does not end when it has provided a place to work, work to do, and the regular payment of a certain sum. It uses up human life and it is, therefore, morally obligated to protect that human life, while it is extracting the serviceable and after it has left only waste. . . . The popular conception at one time was of the soulless corporation, its machinery was not allowed to deteriorate, but the worker received relatively little attention. Men of broad, keen, penetrating vision recognized this injustice and economic waste. Their reasoning was simplicity itself for they stood upon the fundamental principle of the value of the human, a value above property, above institution, and that the conservation of the thing most valued was the first law of an effective working plan."

Allow me to digress for a moment to give you three quotations from the present:

Eric O. Johnson, President, U. S. Chamber of Commerce, states that the attitude which the government and people will adopt toward business in the postwar years will be guided by the degree of social consciousness shown by industry.[21]

Alfred P. Sloan, Chairman, General Motors: "People will demand of government through political action what they cannot obtain through private enterprise."[22]

T. Spencer Shore, Vice-President and Treasurer, General Tire and Rubber Company, Akron, Ohio, asserts that, if the system of free enterprise is to survive . . . . industry must realize that we are in a people's age and property rights will be respected only if human rights are respected.[23]

To return to the quotation from my 1917 paper: "Whatever increases the average health of the employee, increases . . . . the health, happiness and goodwill of the individual with his consequent goodwill, loyalty and devotion to the firm. It has been conclusively demonstrated that such activities, *when properly directed*, not only reduce illness and accidents and raise the standard of living, but also give direct results in increased efficiency and production. Health is of the utmost importance and so an attempt is made to preserve the body in good condition rather than to cure it after it is diseased. The cure of disease is of great benefit and has its place, but the financial and human benefits of increased *preventive* work are far greater. It is significant that a constantly increasing proportion of the activities of health departments in industry is devoted to education in personal hygiene, health and *prevention*."

I made the above statements 25 years ago. I would like to add a quotation from Dr. Richard Brown[24] of London, England, who wrote 260 years ago, "you find no pain, and think all is well. A physician seems as useless as a captain in time of peace. Consider well, that fortification, a main point in the art of war, is most properly exercised in peace and that it is too late to build the walls when the gate should be shut against the enemy. And I count it a piece of skill in a physician far surpassing the most admirable cures, to preserve a man from all disease."

The man who operates the machine and who fabricates the material is industry's most valuable asset. Industry does not hesitate to call in an expert, periodically, to examine and test an intricate and delicate machine in order to prevent its deterioration. It has been estimated that a typical company has $8000 invested for each man employed. It seems reasonable, therefore, that, to utilize that $8000 investment to its utmost, the employee should receive as much care as the machine. The modern viewpoint is to assure longer working years at increasing peaks of usefulness of that employee by making available to him a complete preventive health service. In this connection it must be emphasized that no health service is completely preventive if it ignores mouth infection.

Mouth Infection Recognized 25 Years Ago

EARLIER in this paper, I stated that mouth infection can cause disease in every organ and structure of the body and you, no doubt, have been waiting for me to discuss further the relation of mouth infection to the serious health problem in industry. Even before 1917 progressive industrialists realized the import of this relation and acted constructively, as the following excerpt from my previously quoted article indicates:

"The reason that dentistry has come to the front as an aid to health betterment is that only recently has it been conclusively proved and publicity given to the fact that many general body diseases come from disease conditions about the teeth . . . . and, therefore, we find that a large number of firms have Dental Infirmaries and many more are contemplating the placing of dentists in their plants."

Recognition of the detrimental effects of mouth infection as related to the important industrial health problem is, therefore, nothing new or faddish and I must emphasize this further by quoting from another published article entitled "Dental Services at the Chicago Plant of Montgomery Ward & Company," which I wrote, also in 1917. This dental department was a five chair clinic which I inaugurated in 1915.[25]

"The phase of health that is of especial prominence at present is the relationship of septic and neglected teeth and mouths to general systemic diseases, and in view of this it is not surprising that special consideration now be given to good dentistry by many large corporations. We realize the dangers to health from focal infections around teeth . . . . the cause of such diseases as rheumatism, heart disease, kidney disease, joint infection, eye infection, neuritis, pyema, septicemia, etc. has been traced to infections around teeth."

Dr. Mayo's Early Emphasis

IN 1916 Dr. Charles H. Mayo of the Mayo Clinic, stated: "The next great advance in the prevention of disease, and that wherein dentists are so much interested, is the knowledge that chronic diseases, acute diseases and special local diseases come from mouth infections in the majority of instances."[26]

In 1919 Dr. Mayo wrote, "The chronic recurring diseases of which men die in middle age . . . . are . . . . preventable conditions due to mouth infection in the large majority of cases."[27]

In 1925 Dr. Mayo said, "It is now estimated that about 88% of all deaths, except those due to accidents, are the result of infection."[28]

One must add here that a large proportion of the deaths due to accidents are indirectly due to disease which causes physical impairment and consequent mental preoc-

cupation which detracts from mental alertness. National Safety Council publicizes: "Accidents don't happen. They are caused. They can be prevented."

How Mouth Infection Causes Chronic Systemic Disease

ASSERTIONS of the widespread effects of mouth infection may seem, at first thought, to be fantastic. When it is realized, however, that mouth disease may have associated with it, not only innumerable supposedly harmless bacteria, but also a majority of the most pathogenic organisms known to the bacteriologist, and that the blood supplying the mouth, in intimate relation with this infection, subsequently flows to all parts of the body, one should be able to visualize that, as long as mouth infection remains, the dangerous germs and their toxins are slowly, continuously, and insidiously seeping into the blood-stream and from it into every cell in the body.

Thus it becomes evident that disease of any organ or tissue can be caused by mouth infection. The direct result of continuous absorption may be an acute flare-up of infection in the eye, a joint or some internal organ. More often the result is a slow, gradual, and accumulative degeneration of each tiny cell thus producing functional, general physical, and mental changes, changes that, in specialized tissues, cannot be reversed after they have once occurred and consequently result in irreparable damage. Such changes also lower tissue resistance to other infections and increase susceptibility to, and detrimentally influence, the course of other pathologic conditions, thus the indirect effects of mouth infection may be far more serious than the direct effects.

Chronic diseases of the kidneys, heart and blood vessels, including high blood pressure, cause more deaths than all other diseases. Of all deaths in Illinois in 1941 their total was approximately 53%. *Disease* of these structures seldom occurs suddenly. For example, when one reads of a person in apparent good health "dropping dead" from heart disease, though the failure of the heart was sudden, the usual cause of that failure was degeneration of the cells of the heart due to repeated slight or severe infections, or the continuing absorption from focal infection over months or years.[20]

In the discussion of the serious results of the absorption of chronic infection, it should not be inferred that all infection originates in the mouth. It may also be absorbed from tonsils, sinuses or any other region that harbors chronic infection. It is claimed, however, that the mouth is the most prevalent and prolific source.

Accelerated Ageing and Industrial Significance

THE death rate from childhood diseases is going down but the death rate from the chronic degenerative diseases of maturity is going up. It is seemingly probable that the latter situation is caused by the hastening of the ageing of the individual cells of the body by degenerative deterioration due to the absorption of bacterial poisons. If no sources of absorption were allowed to exist in the body from childhood on, it should be expected that there would be only normal physiological ageing, the acme of "preventive geriatrics." A large proportion of adult disease would, therefore, be prevented and the span of life greatly prolonged. This should be of interest to the industrial executive because the average age of workers is rising.

Of further interest to the industrialist is the growing proportion of women employees since women, being more delicate physiologically then men, are more susceptible to disabilities resulting from absorption of infection.

Underlying Causes

IN the first part of this paper I stated that practically all adults have mouth infection and later I discussed its serious consequences. One should certainly attempt to analyze why such a serious health menace continues to assume such alarming proportions.

Probably one explanation is the fact that *chronic* infection in the mouth seldom causes pain or discomfort and, therefore, progresses unsuspected. A whole jaw may be destroyed without any discomfort or any exterior indication of trouble, if the infection process develops slowly.

Another erroneous notion, similar in nature and which I mentioned earlier in the paper, is that, after a tooth has been removed, *that* region must be healthy. Chronic infection may remain long after a tooth has been removed because the adjoining diseased bone can heal over and gradually involve adjacent bone. For this reason, a competent mouth examination always includes regions where teeth have been removed.

Another misunderstanding is the failure to realize the fact that teeth seldom repair themselves, as do other tissues of the body, when they are injured by accident or disease.

Undoubtedly another reason for the continuing high incidence of unrecognized mouth infection is the existence of several misconceptions on the part of dentists and physicians as well as the laity.

One of these is the belief that the seriousness of mouth infection is in proportion to its size or amount. One small region of mouth infection, so small that it is likely to be ignored, may be many times more dangerous than a much larger region of infection elsewhere in the same mouth. For example, we may find a serious eye infection showing no improvement following the removal of a pulpless so-called "dead" tooth including a large amount of adjacent diseased bone, whereas this same eye infection may begin to show improvement in two hours and clear up completely in a few days following the subsequent removal of another pulpless tooth that "shows nothing wrong around it in the x-ray."

Incidentally, it has been estimated that eye accidents cost industry 100 million dollars annually. The eye is especially susceptible to infection from the mouth, so much so that competent eye specialists do not approve of operating without previously clearing up mouth infection. Much of the aftermath and extended disability from eye accidents would be avoided if employee's mouths were healthy, because trivial eye injuries may end disastrously when mouth infection is present.

Another example illustrating that the seriousness of a region of mouth infection is not necessarily related to its extent: an acute joint infection may not be benefited by the elimination of so-called pyorrhea involving exceedingly extensive gum and bone tissue around one tooth, whereas this same joint infection may improve spectacularly after subsequent treatment of "just a tiny bit of infection" of the gum tissue adjoining another tooth.

Incidentally, continuing disability from low back pain and some types of rheumatism is usually due to absorption of infection. The ill effects of strained joints and ligaments should be over in a few days; disability extending into weeks or months is generally due to absorption of infection, usually mouth infection.

The mention of joint infection reminds one of the all too familiar misinterpretation of the facts in chronic arthritis. It is generally recognized that infection is the underlying cause of many types of arthritis, but, after irreparable damage has resulted and, as a last resort, diseased teeth are removed, the fact that the arthritis continues does not indicate that the teeth were not the original cause.

Another widespread misconception is that abscessed and pulpless teeth are the only source of mouth infection which may cause systemic infection, and that gum infections, including so-called pyorrhea, can be ignored, whereas my experience is that gum infections are as great a source, if not greater.

Still another prevalent misconception is that one can diagnose all mouth infection by x-ray. An x-ray examination alone without a competent mouth examination may seemingly indicate disease when such does not exist and thus cause unnecessary operations, or may fail to disclose serious disease thus giving the individual a false sense of security. A more detailed discussion of competent mouth examinations was given in a previous paper.[20]

The greatest misconception of all exists between members of the health professions as to the significance of the findings following a competent mouth examination. Further discussion of this point follows:

The Menace of Mouth Infection

PATIENTS are often advised that, as long as they are apparently in good health, mouth infection may be ignored. Waiting until the general health becomes affected, however, is hardly in accord with our ideas of prevention of disease. It is then too late, not too late possibly to clear up local pain, an acute eye infection, or an acute joint infection, but too late to prevent or overcome the degenerative effects that have already taken place in these tissues and in the internal organs due to long continued absorption of toxins from mouth infection.

In the same category is the patient whose apparent good health has been confirmed by a medical examination. For years I have contended that chronic infection from teeth can cause extensive degeneration of the internal organs before a routine medical examination could disclose such a condition. Apropos of this, I quote Dr. A. J. Carlson, Professor Emeritus of Physiology, University of Chicago:[31]

"It is nevertheless a fact that modern medicine has not yet developed diagnostic methods to detect the beginning of injury to, and depletion of, the great reserves in the human body . . . . the body may be seriously damaged without the individual himself aware of it in the sense of pain or weakness, but also without the ablest of physicians at present being able to ascertain the same with certainty."

Dr. Carlson thus confirms my conception of the urgency of removing all infection from the mouth, even though the individual is in apparent "good health" and even though a medical examination supposedly confirms this "good health."

Constant absorption of infection from teeth and mouth causes a gradual loss of physiological function of vital internal organs and other essential tissues through degeneration. An employee may be half sick and yet not aware of it. Of far more serious import than the production losses from *absenteeism* due to illness, are the production losses due to the fact that a large proportion of *employees on the job* are actually "sick" and are thus working at greatly lessened efficiency. Such workers are a safety hazard to their fellow employees as well as themselves.

My evaluation of the menace of mouth infection is in agreement with that of Dr. E. C. Rosenow, of the Mayo Clinic, who in 1940 was quoted by Dr. Louie T. Austin:[32] "In summing up my views of the problem at this time, I can do no better than quote the following statement (I) made in 1919: 'A sane and comprehensive effort toward the prevention and cure of septic foci in the dental and other areas will result in the alleviation of human suffering, in a better preservation of the tissues in old age, in a longer average duration of life, in increased mental and physical efficiency, in the prevention and cure of acute and chronic disease, and, through the laws of heredity, make for a sturdier race'."

A Mouth Health Program for Industry

IF AN industrial concern aims to make prevention of disease a reality and to protect employees to the fullest degree, and thus avoid incalculable loss to employer as well as employee, it should make its industrial health service complete by placing full emphasis on prevention and, as one phase of that emphasis, it should provide a competent mouth health service.

A large plant should have a properly equipped dental department manned by personnel sufficient to examine each employee once annually.

A medium-sized plant should have a department manned a sufficient number of hours each day to examine each employee once annually.

A small plant should have arrangements with a competent dentist in private practice to examine each employee once annually.

There are several functions that should be performed by the dental department and it is assumed that, in the performance of these functions, there must be complete cooperation with the medical department.

(a) The primary function of the dental department is to provide a competent mouth examination service which will diagnose *all* mouth infection and obtain action in eliminating such infection. Whether or not the plant personnel should do the required work of eliminating mouth infection depends on the depth of interest of the plant management. The prime requisite is to find all infection and to inaugurate a follow-up assuring that all this infection has been eliminated and that the employees' mouths are in a condition of health.

The health phase of the mouth problem, if competently and completely cared for, is so vast that I can hardly conceive of a plant being sufficiently interested to attempt to add to that service the incalculable undertaking of a complete dental service which would include mechanical restorations. The department should assure itself however, in its check-up examinations, that the employee is receiving competent restorative work. The mouth examination should not be considered adequate or competent unless made in conjunction with a radiographic examination. A radiographic examination alone is worthless. All records should be kept as complete and accurate as possible to enable management to determine the value of the dental department by comparison with medical records over a period of years. Such records are also invaluable for identification purposes in case of mutilating disasters.

(b) The second most important function of the dental department is health education of employees. They must be convinced of the importance of prevention and the ultimate seriousness to health and life of common and apparently minor disease conditions including pulpless teeth and so-called pyorrhea.

(c) Another function of the department is to aid in prevention by diagnosing all mouth manifestations of general systemic and occupational disease and by diagnosing the multitude of miscellaneous local diseases of the mouth including malignancies.

(d) Yet another function is the care of traumatic surgical conditions of the mouth, teeth and jaws.

(e) An important function, although most assuredly not the most important in spite of its being considered so by misinformed management, is the treatment of emergency acute and painful dental lesions such as toothache, neuralgias, abscesses, stomatitis, trench mouth, etc.

(f) An additional function is to assure that, where consultation in special field of dentistry is necessary, the employee be directed to competent consultants.

Further discussion of these functions was made in a previous paper.[33]

Confirmation of Value

DR. HART E. FISHER, Chief Surgeon and Medical Director, Chicago Rapid Transit Company, states,[34] "With 30 years' experience in industrial medicine and surgery, it is my firm opinion that mouth hygiene, properly directed, as a preventive measure will be conducive to a marked reduction of industrial absenteeism from illness and injury. Many of the complications, so frequently seen following an otherwise trivial injury or illness, have resulted from tooth and gum infections which were not discovered because only a superficial dental examination, or none at all, was made."

Dr. R. J. DeMotte, former Chief Surgeon at the Pullman Plant of the Pullman Standard Car Manufacturing Company: "From an experience of 25 years in industrial medicine, it is my belief that dental sepsis is the most prolific source of ill health among working men."[35]

P. J. Brand, Director of Safety and Compensation, Pullman Standard Car Manufacturing Company,[36] "There is a great need and a tremendous field for more education and publicity to bring industrial management and workers to a realization of the serious physical and mental effects of bad teeth, which contribute so greatly to unsafe practices, inefficiency, material spoilage, production errors and time loss caused by ill health and injury."

Summary and Conclusion

THE HIGH incidence of mouth infection was discussed. It was emphasized that the waste of manpower through accident and disease is enormous, that a large proportion of accidents have sub-par general health as an underlying cause, that the vast bulk of man-hour loss does not result

from occupational disability but is due to general systemic disease, and that most systemic disease can be prevented.

The menace of mouth infection, the most prevalent and prolific source of infection which is the underlying cause of systemic disease, was emphasized and an analysis given of the reasons for its continuing high incidence. The benefits to industrial health of preventing or eliminating mouth infection were pointed out, both by statements made over 25 years ago and by recent quotations of authorities in industry confirming these benefits. The role of a competent dental department in a mouth-health program for industry was discussed.

The conclusion is that every industrial plant should make available to its employees a competent mouth-health program. Such a program will be invaluable, not only from the standpoint of health and efficiency, but also from that of employee and socio-economic relations.

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Procaine Solution

—In the Treatment of Industrial Trauma—

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THE URGENT request of all employers that we keep their injured men at work, if possible, and the natural desire of these men to work, have encouraged the local use of procaine solution in the treatment of the various myofascial traumata routinely encountered in an industrial practice. During the past 12 months at the Blanchard Industrial Clinic we have injected a selected series of 137 such injuries.

Low back strain	21
Injuries to the bony thorax	41
Shoulder injuries	25
Ankle sprains	13
Epicondylitis humeri	22
Contusions to the knee	7
Contusions to the coccyx	6
Sciatic neuralgia	2

Selection of Cases

OBVIOUSLY not all patients presenting themselves with these types of injuries were treated by injection. In general only those patients in whom the injury was of such a degree that a prolonged period of disability might reasonably be expected were so treated. Thus, injection of the back for the so-called low back sprain was limited to those cases in which there was a marked degree of lumbar rigidity, scoliosis and the lumbar pain with or without radiation. Only chest injuries, with or without rib fracture, in which respiration was very painful and markedly restricted were injected. The shoulder injuries so treated were those in which marked pain was attended by loss of active motion either due to damage to the muscular cuff or to voluntary muscle guarding. The notorious prolonged period of complaint and disability associated with the simple "tennis elbow" or epicondylitis humeri warranted injection whenever possible.

A number of patients presenting these types of injuries were discomforted to the extent of warranting injection, but because of their reluctance to accept any type of treatment that has to be given with a needle, refused the proffered treatment.

A few patients were of the extreme emotional type and, having had some experience with these same individuals upon the occasion of previous injuries, we felt that any other than the simplest, most inocuous type of treatment might aggravate rather than improve their complaint.

We did not inject those individuals who were unable to adequately localize their pain. The patient with diffuse complaint who "hurt all over" was not a suitable subject for this type of treatment.

Solutions, Technique, and Reactions

ALL INJECTIONS were made with a 2% procaine solution. We felt that this was preferable to the injection of a larger amount of a weaker solution. No adrenalin was added to the solution, which was frequently and freshly prepared.

The patient was treated in the prone or supine position after first eliciting by questioning and palpation only those points of local exquisite tenderness. Following injection the patient was again asked to find his "sore spot." Failure to locate the same spot indicated a successful block. The patients were encouraged to return to work if possible and actively to use the part, in that injection without the follow-up of active use invalidates the entire procedure.

The usual precautions to avoid intravenous injection were observed.

Two patients reacted immediately with vertigo and nausea of but short duration. One patient had a prolonged session of nausea and emesis which was controlled by barbiturate per rectum within 24 hours.

Mechanism

THE manner in which procaine works has been the subject of a number of theses. It interrupts the vicious cycle established by the afferent sensory stimuli arising from the areas of trauma which, in turn, set up efferent stimuli to produce muscle spasm and serum exudation (Leriche.) Like curarine it is supposed to

depress the response of motor and plates to acetyl choline, and it may also act upon the terminal motor nerve fibers to interfere with the liberation of acetyl choline itself.[1] That it permits something like normal painless motion and an increase in local vascularity is obvious to any operator who employs the procedure. Considering, then, the fact that the almost spontaneous and natural reaction to any injury is first to rub the part and then to move it vigorously, if possible. Procaine merely facilitates a normal physiological response to trauma.

Results

THE so-called low back strain comprised 21 cases of this series. Breaking down the group for analysis:

- 9 cases returned to work without loss of time.
- 12 cases resulted in a total loss of time of 151 days or 12.5 days/case.
- 2 cases accounted for 91 days of disability or 60% of the total lost time.
- 2 cases required re-injection.
- 2 cases responded poorly to injection treatment.

Of the cases responding unsatisfactorily, one clinically presented considerable posterior root irritation and x-ray evidence of a marked hyper trophic arthritis of the lumbar spine. The other case subsequently presented neurological findings suggestive of intervertebral disc pathology.

Ten cc. of material were injected into the area of maximum tenderness which generally was located in the angle between the posterior superior spine of the ilium and the spine proper. In most instances the local relief was considerable, the patient being able to dress himself and remain active. The scoliosis generally disappeared within the first five days. Injection was supplemented by the usual physiotherapeutic modalities and the patient encouraged to return to work.

Epicondylitis humeri has proved a most disabling and difficult complaint to treat. Prior to the collection of this series, patients were treated in the usual manner with diathermy and massage, application of moist heat, pressure dressing, cock-up splintage and deep x-ray therapy. The results were unpredictable and generally unsatisfactory. Within the last year we have injected 22 cases with the following results:

- 6 cases have continued to work without loss of time.
- 12 cases resulted in a total loss of time of 148 days or 12.3 days/case. Average length of treatment per case was 22.2 days.
- 2 cases accounted for 75 days of lost time (50%) and 185 days of treatment (46%) and of these, one case had an arthritis of the proximal radio-ulnar articulation and still complained when treatment was terminated almost four months later.
- 4 cases did not return for subsquent care and we have no record of their progress.

In treating these patients we used the smallest amount of procaine which would produce local relief, usually 0.5 to 2.0 cc. The tissues in the region of the origin of the common extensor tendons do not have the volume of the tissues in the back or shoulder and cannot accommodate a sudden increase in local vascularity without causing the patient to have a marked exacerbation of pain of a throbbing nature, probably produced by a marked congestion of the part and an inability of the tissues to distend sufficiently to accommodate the change. Treatment was supplemented by physiotherapy and, if possible, the claimant was given a different type of work. We have not tried manipulation; it may be a very satisfactory procedure.

We consider local procaine intercostal block the treatment of choice for severe chest contusion with or without rib fracture. Forty-one cases so treated had negligible periods of disability, marked freedom from discomfort, and none of the disturbing skin irritations which follow the use of adhesive strapping. This procedure is applicable to obese patients where strapping or a binder would be impractical. The intercostal nerve or nerves may be blocked at any point proximal to the point of injury and can be made more accessible by positioning the patient, for lateral and anterior injuries, in a lateral recumbent position with the arm of the presenting side extended over the head.

The shoulder injuries were of the following types:

- 20 cases—Simple bursitis, contusion, cuff strain and supraspinatus tendonitis.
- 4 cases—Rupture of the tendon of the supraspinatus.
- 1 case — Adhesive periarthritis (frozen shoulder).

Procaine proved of greatest value in the first group, and it was our impression that there was a definite lessening of disability as compared to treatment with physiotherapy, active exercise or rest.

Procaine was without effect in the group of ruptured supraspinati, although it may have reduced somewhat the severe night pain which these people complain of in the early weeks of their disability. Permanent disability and lost time were not affected.

Procaine was of no value in the case of adhesive periarthritis; in fact it actually seemed to aggravate the complaint.

The question of prognosis is very important in shoulder injuries. Procaine is valuable as a diagnostic agent to determine whether or not the loss of motion so common with shoulder injuries is involuntary due to loss of tendon continuity or voluntary due to protective muscle spasm secondary to pain.

Ankle sprains were treated by injections with but fair results. Of the 13 cases so treated, six lost more than seven days from work, one losing 21 days. The remaining seven cases continued at work with treatment supplemented with an elastic supportive dressing and physiotherapy.

Six cases of contusions about the knee responded in a favorable manner with respect to the lessening of pain and disability. One case had an associated injury to the internal collateral ligament and so could not be treated adequately without immobilization.

Six patients with injuries to the coccyx were treated by injection. The results were no better than treatment by other methods.

Two cases of sciatic neuralgia were treated by local injection of a fixed painful area beneath the gluteal fold. In each case, the nerve was contacted as indicated by the paresthesia produced by probing. In each instance the painful area was obliterated and the affected extremity fully extended cephalad so as to stretch the involved nerve. In these two cases results were very satisfactory, and both patients were discharged within two weeks without a recurrence of complaint to date. Obviously this form of treatment is not applicable to sciatic neuritis secondary to posterior root pressure, cord tumor, or due to any of the varieties of metabolic or deficiency diseases.

Conclusions

PROCAINE is an excellent therapeutic agent, and, when properly and selectively employed, should be very gratifying both to the operator and his patient.

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Treatment of Industrial Injuries

—New Trends—

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YOU MAY not agree with all the things I say in presenting this subject, but I give them to you as the thoughts, observations and routine daily experiences of a physician in his work in this rapidly growing and always fascinating specialty of industrial medicine and surgery.

We can consider the new trends in the treatment of industrial injuries under four main heads:

1. Recent injuries and infections.
2. Fractures and dislocations.
3. Physical therapy.
4. Problems in the art and tact of handling employees.

The greatest advancement in the primary treatment of injuries has come to us during the past few years. Prompt, efficient and intelligent treatment of minor and serious injuries has now been supplemented by the use of sulfonamide directly into the original wounds. We all see dirty wounds of the hands or feet come into our clinics, with lacerations and bleeding, sometimes injuries to bone, nerves, tendons and muscles. The serious injuries are referred to the hospital for cleansing, local sulfonamide therapy, suture or other indicated treatment. In many flap lacerations of the scalp, face and hands, the bleeding is controlled, flaps lifted back with forceps and sterile sulphanilamid dusted and sprinkled directly into the wound. This sulphanilamid, or other sulfonamide, should be sterile; and it can be placed in liberal quantities without hazard, but there should not be so much of it as to interfere with the closure of the wound. Be careful not to get it in the eyes, as it is painful and may set up a conjunctivitis. A much higher percentage of primary wounds so treated within the first hour or two after injury go on to primary healing. A very much smaller percentage than formerly become infected. We can now close by suture, and immobilize with bandages and even plaster of Paris splintage, wounds that formerly we dared not close. Wounds that had to be kept under constant observation to recognize infection that might be developing, are now observed without removal of dressings and by watching for localized swelling or temperature changes.

Many surgeons are taking advantage of the preventive value of sulfonamides in cases of injuries. In the army and navy wounded men are instructed to take sulphanilamide or other sulfa drugs internally immediately after injury and sometimes long before medical treatment can be rendered. In industry, then, when we have injuries of a severe enough magnitude, most of which are hospitalized, it is certainly good treatment to prevent infection of wounds by giving the sulfa drugs internally for the first five or 10 days, thereafter in gradually decreasing doses.

As to those cases where the patient does not come to you until he already has an infection, here again we take full advantage of preventing spread of the infection. Cellulitis, following injury, yields well to massive internal sulfonamide therapy, although the local application of sulfa drugs or sulfa ointments is of almost negligible value after the infection has once started. Of course in addition we use all the well recognized principles of treatment of infection, physiological rest to the part and person, localization of infection by hot packs, incision and drainage of abscesses, etc. It has been my observation that most infections localize much faster, and in some instances abscess formation is prevented, by internal sulfa therapy. I prefer sulfadiazine internally, giving with it an equal amount of soda bicarb that seems to eliminate all gastric irritation. When we stop to realize that 90% of the spontaneous cases of osteomyelitis occur as complications from superficial skin infections such as boils, then we realize how worthwhile it is to clean up and heal boils and skin infections as quickly as possible. The fire department does not tease along small fires. They put them out as fast as they can. Likewise we should heal small or early infections as quickly as possible. In some cases of repeated staphylococcic infections such as boils, styes, axillary abscesses, nose infections and the like, I have had satisfactory benefits from a source of staphylococcus toxoid (digest-modified) injection therapy.

We can here only briefly mention the great advantages of penicillin treatment, which is still practically always a hospital procedure. It has saved many lives and reduced the complications and severity of many infections. Its value is mainly in streptococcic, staphylococcic, gonococcic and similar infections. It is a life-saving godsend to these patients who cannot take the sulfa drugs internally without severe reactions.

IN THE treatment of fractures and dislocations, there is a trend to much earlier and more frequent x-rays of injured hands, feet, elbows, knees, shoulders, etc., especially when there is an adequate history of sufficient trauma. We are well satisfied if 50% of the cases we x-ray have fractures. Much better to take a few more x-rays than to pass up one or two fractures. Nothing brings more discredit on a plant medical department than to have the family physician pick up a fractured foot, toe, hand or finger that was missed at the plant simply because an x-ray was not taken. There are other values recommending early x-ray of more cases, and one of the most important is to establish medicolegally the presence or absence of fracture, and also to establish the presence of old fractures and old pathology that can definitely be established if x-rays are taken in the first two or three weeks. Let the case go six months or a year and then it is not so easy to prove that the old pathology antedated the injury. One other important value is the fact that by taking the x-ray early after adequate trauma you gain the confidence of the patient. You can tell him positively that there is no bone injury or fracture, and he usually appreciates your thoughtfulness and interest. In cases of dislocation it is imperative that x-rays be made before the dislocation is reduced. This rules out complicating bone fractures and preserves and establishes, by the best evidence, the existence of an actual dislocation. The scarcity of x-ray films showing dislocated fingers is usually due to the fact that most of these dislocated fingers are reduced before the x-ray is taken—many times by the patient or one of his friends pulling on the finger. Many an intern's or young doctor's diagnosis of dislocation has been doubted simply because he did not have an x-ray of the condition before he reduced it.

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NOW I COME to one of my pet problems in the treatment of fractures. Why do we splint and immobilize fractures without much displacement? Remember, I said "without much displacement." That means that the bone fragments have not moved out of their normal place, or even in some cases show very little displacement. If the original injury was not sufficient to cause the bones to move out of place, certainly the subsequent treatment and the patient's conduct are not going to displace the fragments. There are, of course, some exceptions that prove the rule. Both bones of the forearm fractures, or weight bearing on the bones of legs or metatarsals of foot, are such examples. We immobilize or support such fractures by splints only long enough to relieve pain. I have seen many fractured fingers and toes that were relieved of great pain by simply removing tongue depressor, adhesive tape or even plaster of Paris splints. In most instances these patients are much more comfortable with a simple gauze or sheet wadding dressing. Usage of the part is indicated early within the patient's tolerance. That is, he should use the injured part to the maximum extent of his comfort. I believe that we get better preservation of muscle, joint, nerve and even bone function and tone if we start easy and early movements of these muscles and joints, passively at first, later actively within the patient's comfortable tolerance. The blood and lymphatic circulation is always improved, and much better in early mobilization and usage of the injured part. One very striking observation of this point occurs when we compare the edema, swelling and disability of a fractured ankle treated by the old method of immobilization in a cast without weight bearing and using crutches for months, with that ankle fracture which is treated by weight bearing being permitted in a cast with a walking iron or walking heel support. The former has a lot of edema after removal of the cast; the ankle is stiff and painful and many weeks are required to bring about weight bearing. In the latter instance, when the cast with the walking iron is removed there is very little edema and swelling after removal, and the patient puts on his shoe and starts right out to walk, sometimes with a cane and sometimes even without a cane. From many such observations, I believe that in cases of fractures without displacements or with very little displacement, early movement and early usage within the patient's comfortable tolerance is indicated, and is most effective in shortening disability periods and reducing permanent disability end results.

Metatarsal bars properly placed on the underside of the instep of a shoe have been most helpful in permitting patients with fractured metatarsals or toes to walk around early.

The use of long Kirschner wires in the immobilization of long bone fractures, such as the radius, ulna, humerus, tibia, femur and even metacarpal, metatarsal and phalange fractures, is meeting with excellent success in many surgeons' hands.

WE NOTICE that there are definite trends in physical therapy treatments. Whenever I come to the discussion of this subject of physical therapy, I feel compelled to cry out in protest against some of the practices that are still called physical therapy. One of the worst of these involves the so-called heat lamp treatment, given for most anything, by almost anybody, almost anytime, and with almost any result. A few specific examples will serve to show you why I condemn that type of treatment. Many problem cases several months old came to me for evaluation of their injuries and suggestions for further treatment. In taking the history, too often I find that the doctor saw the patient the first time, started a heat lamp treatment of 20 to 30 minutes' duration, and the nurse or some other office attendant gave him the treatment subsequently. In one recent case there was not even office help enough for that, so this patient went into the room, turned on the lamp, took his treatment, turned off the lamp and went his way with only a fleeting glance from the nurse attendant. In several other instances, I have known of heat lamp treatments being given to injured parts that are enclosed in plaster of Paris casts—knees, arms, and even backs—with plaster of Paris body spica casts being placed under heat lamps, with the casts on, for 30 or 40 minutes. Wasn't the cast enough without adding the discomfort of an ineffective heat lamp treatment? There is much more worthwhile work to be done intelligently in this physical therapy field than procedures such as these which do not deserve, in the least part, the name of physical therapy. Each case turned over to receive physical therapy should first have a thorough examination by a competent physician or surgeon, and he should see and examine this case at sufficiently frequent intervals so as to be responsible for its improvement and treatment. He need not see the patient every day, but he should examine him at least once a week, or, better, twice weekly. A weekly or periodic conference such as this would involve between the physiotherapist and the attending surgeon can be made most valuable to the patient. A trained physiotherapist knows by experience what results are to be expected from each type of physical therapy treatment. When such improvement does not occur, she then is on her guard, looking for conditions or factors that might be modifying or delaying recovery. In this connection we have learned that abscessed teeth are associated with about 50% of the subdeltoid bursitis shoulders, and even those shoulders with demonstrable calcification in the subdeltoid bursa. Recently we have confirmed Dr. William R. Cubbins' observation that many calcified subdeltoid bursitis cases have a high uric acid blood chemistry, establishing a common relationship to gout.

Another valuable observation of cases not responding to physical therapy treatment concerns those unfortunate individuals who suffer from a genuine Sudek's atrophy or painful bone atrophy. It is better not to expect too rapid improvement in that type of case, and to keep the employer posted on a guarded prognosis.

Still another value in properly administered physical therapy is the information obtained about patients with doubtful complaints—those in which the physical findings are not consistent with the patient's statements. After a 10-day or two-week therapeutic test treatment period, the surgeon and his physiotherapist can convince themselves that the patient is a malingerer or a gross exaggerater. Recently one such shoulder case was found never to keep afternoon appointments for treatments. In 10 days we had the information that he was running a racing book at the track and, of course, couldn't come in for afternoon treatments. He was sent back to his job—which was day work—and told that if he wanted to continue running a racing book in the afternoon he had better get a night job. It is surprising how often such patients reveal themselves and their motives for continuing disability. One employee earning $60.00 a week brought in enough insurance benefit papers to pay him $100.00 a week

Who couldn't afford to remain disabled under such conditions?

JUST a few remarks about back cases. All back sprains are by no means protruded intervertebral disc cases. Back cases occurred, a great many of them, before the days of the protruded discs, and most of them recovered, Some of them undoubtedly were disc cases, and they did not get well or their sciatic nerve symptoms persisted. Remember that the disc case usually comes from a lifting effort, has some disability immediately, and usually greater disability within 24 to 48 hours. There are almost always loss of Achilles' tendon reflex and an area of anesthesia. More detailed differential diagnosis is left to the neurological and orthopedic surgeons. Some excellent traumatic surgeons advise absolute bed rest immediately for the injured or sprained back. This hospital type of treatment is certainly excellent and to be recommended where feasible. We realize that jolting and jarring a sprained back in an automobile, bus, or even street car, is poor treatment for an acute back, but, in many instances, bed rest with ambulatory activity—such as being up for meals or going to the toilet—does not appear to retard the patient's recovery. From a practical point of view we determine at the time the patient is seen as to whether he should be treated in the hospital as a bed case or at home as a semi-ambulatory patient. Give him reasonable treatment, bed rest, support to the back, rigid bed if necessary, analgesic and sedative medication, and palliative relief measures such as an electric pad, hot water bottle, hot tub baths and massage in moderation. If after three to five weeks such a back case is not making satisfactory progress toward recovery, it will be advisable to get him in for more study; and then you can exert yourself to your utmost and give him everything you've got to try to make a complete and accurate diagnosis. This would include x-rays of his spine, and x-rays of teeth and sinuses to rule out focal infection, prostatic examination, blood counts, blood chemistry, basal metabolic test, special tests for typhoid, undulant fever, etc., special x-rays for intervertebral disc with contrast media, spinal puncture, neurological and orthopedic examinations and consultations, and any further measures that may aid.

I would like to mention something about back pain that we have observed and that is as to its being a referred pain, coming from inguinal hernia. In almost 50% of our hernia cases we find they have pain referred to the upper sacral and lumbosacral region of the back, much the same area to which prostatic pathology refers its pain. So constant a finding is this that we believe the converse statement to be true, many cases of back pain being due to inguinal hernias of which the patient is not aware. For this reason every hernia case is asked if he has back pain, and likewise every case of back pain is examined very carefully to rule out inguinal hernia.

OUR NEXT heading is "Problems in the Tact and Art of Handling Patients." The first prerequisite for a good industrial physician and surgeon is that he be a gentleman at all times, and a similar prerequisite for a good industrial nurse is that she conduct herself as a lady at all times, under the most trying circumstances. I have known doctors to get excited and fly off the handle, and likewise I have seen nurses get mad and excited, fortunately only on very rare occasions. There are times when doctors, nurses and personnel are working long hours, six and seven days a week and 10 to 14 hours a day, and it is no wonder that such conditions are accompanied by the increased irritability known to go hand in hand with fatigue. Doesn't it remind you of the tired irritable child we so often see being taken home at night? Add to a tired, irritable doctor and nurse, an injured equally tired and irritable employee, and you have the makings of a real explosive experience. It is remarkable that these explosions do not occur more often.

The first impression that a patient gets of the plant physician, nurse and medical department is sometimes very important. It is in this respect that modern equipment, clean surroundings, pleasant, kind understanding personnel pay such excellent dividends in obtaining the patient's confidence. Show a genuine interest in the patient's injury problem. To him it is most important, and he may have an anxiety problem even if you can't see objective evidence of traumatic injury. An error of tact is committed when a doctor or a nurse tries to minimize the extent of a patient's injury. It is unwise to say, for instance, "Oh, that is nothing. You should wait until you really get something." It is also unwise to make comparisons between this patient's injury and someone else more seriously injured; to point out that someone was more seriously injured than he was doesn't help him to recover from his injury. Much better it is, if there is a simple injury, to make the necessary examination, explain, tactfully and without ridicule, in a sincere way, that it does not appear to be a serious injury, and that you have every reason to believe the injury will make a complete recovery in a reasonable time. Then proceed to render the necessary treatment carefully, and not in a hasty nor slipshod manner. There are always instances of a hypercritical, antagonistic, fault-finding type of employee who will try the patience of everyone in the medical department. One's first reaction is to argue with such an employee to prove that his criticisms are untrue, incorrect, or not founded on fact. This simply makes matters worse; it is just the argument he is looking for. You are playing right into his hands, because, in this way, he makes a mountainous issue out of a trivial incident. It would seem to me a much smarter and shrewder procedure to be overly nice and, if necessary, overtreat such a patient, if you have the capacity to stand this much abuse and punishment from him. I know that, in many instances, I have won the patient's confidence and gotten a man well who was all ready for an argument, by simply taking time to sit down and listen to his side of the story, giving him a chance to get it off his chest. Then when it's all said, simply state: "Well, John, that sort of thing may be so, but it isn't going to help you get well. Let's see what we can do to help you get well and back to your job, where you will be independent again and getting the satisfaction of being able to do a real honest-to-goodness day's work."

There is a graceful and tactful way to send an injured person back to his job. In minor injuries it does well to say, "You probably want to keep working?" or "Do you think you can keep at work?" or "Would you like to try to continue working?" All of these give the patient an opportunity to make the decision. He decides he wants to keep working, and you have avoided that unfortunate situation where he feels you have ordered him back to work even though he was injured. Many a patient resents and remembers for a very long time the fact

displacement, early movement and competent physician or surgeon, papers to pay him $100.00 a week

that the doctor was unsympathetic and ordered him back to work, when he felt that he should go home. I know of many instances where patients with simple fractures of the toes, or removal of toe nails, have preferred to go back to work under such circumstances. I frequently take the following attitude in helping a patient make a decision as to whether he wants to go back to work: "You don't have to go back to work—you can go home if you want to—but the nature of this injury is such that it is perfectly safe for you to go back to work if you want to. We'll let you go back to work if you think you'd like to keep going." Then, on the release or back-to-work order, we write for the patient's benefit, "Allowed to continue work." How much better that is than to take a dominant attitude, compelling the man to go back to work because you ordered it, or even on his back-to-work order to say, "Ordered back to work."

The term "light" work has become a bugbear to foremen and supervisors. They always suspect the employees of "soldiering," or seeking special privileges and using their injuries to get soft jobs. For this reason when we are ready to send a man back to light work we tell him to go down and talk the situation over with his boss and see if he has some modified work that the injured employee can do. Then when the man comes back, or his boss telephones us about the kind of work he can do, we release him to resume modified work. The boss is satisfied, and the patient happy—and so am I, under these circumstances. The term "modified work" seems to be a much better phrase than light work, in our experience.

Now there is another time in the course of treatment of injured employees that requires grace, tact and artful handling. This is the time when treatment is to be terminated and the patient wonders what you are going to do with him, or what your attitude is going to be toward him, if he has a permanent injury with specific loss or disfigurement. In the first place, we don't believe treatment should be terminated exactly at the same time you send him back to work. We prefer to carry over the treatment period a week or two until the patient has proved to himself his ability to renew work. When a man is released to go back to work we frequently say, "Will you drop in in a week or 10 days and let me know how you are getting along?" If dressings are necessary, this gives us the opportunity of seeing the patient after he goes back to work. In cases of serious injuries or disfigurement, we tell the patient when he resumes work that we know there is going to be some permanent injury and we also know there is going to be further improvement, so we will call him back at a later time—say sometime between six months and a year after his injury—and then give him an appraisal examination and report his permanent disability. Some patients try to hurry their disability settlements, seeking such settlements while the injured member still demonstrates considerable disability. If one can reasonably expect any further improvement then the condition is not permanent, and the permanent disability evaluation should be deferred.

Re-employment of Ex-Service Men and Women
II. Job Analysis for Sound Placement

IT IS the purpose to present a plan of job analysis, together with a plan for coordinating the results with the findings of the examining physician, as a means for facilitating the sound placement and consequently the successful rehabilitation of the returned service man or woman. It is intended that these plans will be sufficiently flexible to permit their adaptation to the needs of the individual business, and that they shall be neither burdensome nor difficult to administer. It should be clearly understood that, while the plan herein discussed is believed to be sound, it is by no means the only approach. Other plans examined by the authors seem to suggest, however, that most of the basic essentials are covered by this proposed plan, which should serve as a useful guide in developing an approach to meet the individual employer's specific needs.

In considering the re-employment of ex-service men and women the problem of placing those individuals who return from service with some degree of disability confronts every industrial employer. Unfortunately many small employers feel that the placement of handicapped individuals, which has been somewhat loosely termed the "rehabilitation," can be undertaken only by the larger employer—that it would be too costly and too burdensome for the smaller employer to enter into this field. In the belief that this is at once fallacious and unsound, both from a social and an economic viewpoint, this study is written.

In order intelligently and effectively to place a person, particularly one who has some degree of physical or nervous disability, three things are basically needed: first, a knowledge of what the job requires of an individual to insure its proper performance; second, a knowledge of the individual's physical capacity to meet the requirement of the job; and, third, the point of view, training, mental capacity, cooperativeness, etc., of the individual to be placed.

While the first of these requirements may be met by intimate personal knowledge of the individual responsible for assigning jobs, in organizations having numerous job or operation classifications it may be most practically obtained from carefully compiled job analyses planned to furnish this particular type of information.

The second requirement will usually be met as the result of the findings of the examining physician. In the absence of a pre-placement physical examination, job assignments, of necessity, are on a trial and error basis and may needlessly result very unsatisfactorily. The wisdom of a competent pre-placement physical examination is therefore stressed. Booklet III—Medical Program of this series deals with this phase of the problem.

The third requirement will usually be met as the result of a personal interview between the individual to be placed and the person responsible for placement. This is discussed fully in booklet IV, titled "Placement and Follow-up."

THE text of the second of a series of booklets designed to familiarize the employer and his supervision with the problems and responsibilities incident to the re-employment of ex-service men and women. The series is intended to stimulate sound, constructive thinking and to guide a practical approach to the end that small industries may assume their proper role in affording every possible opportunity to returned service men and women again to take their place in our industrial, economic and social life. The program suggested in these presentations is based upon the experiences and practices of companies having well organized personnel functions, and upon official interpretations of the law itself. The booklets include the following titles: No. 1 "Obligations of Employer" (INDUSTRIAL MEDICINE, 13:10, 805, October, 1944); No. 2—"Job Analysis for Sound Placement" (above); No. 3—"Medical Program"; No. 4—"Placement and Follow-up; No. 5—"Training Methods." The authors of the text here given are A. J. ZIMMERMAN, Assistant to the Vice-President, Bausch & Lomb Optical Company, R. W. WALDRON, Superintendent of Industrial Relations, Eastman Kodak Company, Kodak Park Works, and I. DENT JENKINS, Personnel Manager of the Harrison Radiator Division of the General Motors Corporation.

The principles of job placement here discussed apply equally to placing one individual or many hundreds or thousands of individuals. The procedure to be set up in any organization will depend upon the size and requirements of the organization. It may be elaboarte where the job to be accomplished necessitates. Likewise, it may be simple to meet the needs of a small business employing relatively few people on a limited number of job classifications. In either instance it is believed that an organized and planned approach will take much of the guess-work out of job placement and will fully justify the time and cost involved. The plan used should be fitted to the existing organization where possible, rather than alter the organization to fit a particular plan.

Job Analysis

HOW IT SHOULD BE MADE: The purpose of the job analysis here discussed is to determine the physical attributes which *each job* requires that an individual should possess in order fully and properly to meet the requirements of the job.

The analysis should determine what physical and nervous attributes must be possessed by a person in order satisfactorily to meet the requirements of the job. The plan of job analysis here presented does not attempt to determine mental characteristics required. These characteristics should not be overlooked, and are discussed in Booklets III and IV.

While anyone who is capable of examining a job and observing it in an understanding fashion, can make a sound job analysis after a little practice, members of supervision are usually best qualified to make their analyses within their respective departments. In any event the development of the job analysis should be carried on in close collaboration with supervision who should also review and pass upon the final result. In an organization having a plant physician, the development of the job analysis should also be in close collaboration with the plant physician.

The analysis can be best made by using a check sheet as a guide in observing the job over a sufficient period of time to insure that a reasonable cycle of work has been observed, and that no essential characteristic is overlooked.

Where the job is not susceptible of specific definition, as is frequently true where an individual may be assigned several different types of work during the course of the usual working day, one must be satisfied to be reasonably certain that the *most rigid* requirements of the work to which such an individual will usually be assigned have been reasonably analyzed and recorded. The refinement of a job analysis can be carried to an extreme point, and considerable judgment is required in determining just how far the analyst should go.

ITS USE: It should be remembered that the purpose of the resulting analysis is to assist in intelligently placing a person on a job which he will be reasonably qualified to perform, with due regard to health and safety. It will provide useful information for the use of all persons who deal with the placement and followup of the individual. The analysis is not the only answer and must be used with judgment and discretion if sound results are to be obtained. This plan is not intended to be an ultra-perfect scientific tool, but simply a practical, usable guide.

SAMPLE FORM: (See "Summary of Operation Requirements" form below.)

PREPARATION OF FORM: First, it should be remembered that this form was built around the conditions maintaining in a particular industry. It may not be fully ap-

SUMMARY OF OPERATION REQUIREMENTS

Operation Title_____ Operation No._____

Date_____

EYES	VISION REQUIRED				APPLICATION																					
	Clear	Average	Very Little	None	Close		Normal	Slight																		
					Continuous	Intermittent																				
EARS	HEARING REQUIRED																									
	Excellent		Average		Very Little		None																			
HANDS	TRAINING REQUIRED		USE OF HANDS REQUIRED				FINGER DEXTERITY			GRIPPING			FOREARM & WRIST													
	Special	Limited	Both	Right	Left	Either	Great	Normal	Slight		Light	Strong														
										Constant																
										Occasional																
FEET * Could use artificial limb	USE OF FEET REQUIRED								WALKING REQUIRED																	
	Both		Left *		Right *		Either *		Neither *		Considerable		Limited		None											
HEIGHT and WEIGHT	EMPLOYEE'S HEIGHT				EMPLOYEE'S WEIGHT																					
	Unimportant		Tall	Average	Short		Important		Unimportant		Preferable Range															
LIFTING	Under 10#	Over 10#	Over 20#	Over 30#	Over 40#	Over 50#	Over 60#	Over 70#	Over 80#	Over 90#	Over 100#	Frequently (Times per Hour)		Infrequently (Times per Hour)												
POSTURE	MAY SIT		POSITION STRAINED		REACHING ABOVE SHOULDER		STOOPING																			
	All the Time		Frequently		Frequently		Frequently																			
	Part Time		Occasionally		Occasionally		Occasionally																			
	Never		Never		Never		Never																			
WORK STATION CONDITIONS	Inside	Outside	In & Out	Drafty	Dusty	Hot	Normal	Dry	WET																	
									Splash		Continuous		Other													
WORK STATION SURROUNDINGS	Continuously Loud Noise		Continuous Average Shop		Quiet	RELATION TO OTHER EMPLOYEES			Other																	
						Works as Member of Crew																				
						Near Others but Independent																				
						Works in Isolated Station																				
OPERATION HAZARDS	MOVING MACHINERY			Soldering Fluxes	Acids	Molten Metal	Height	Other																		
	Presses	Saws	Other																							
PROTECTION	FOR EYES		FOR HANDS		FOR FEET		FOR BODY																			
	Eye Shield		Canvas Gloves		Rubbers		Light Cloth Apron																			
	Plain Goggles		Leather Gloves		Boots		Heavy Cloth Apron																			
	Tinted Goggles		Rubber Gloves		Safety Shoes		Water-Proof Apron																			
	Welding Type Helmet		Asbestos		Safety Toes		Leggings																			
	Other		Other		Other		Other																			
	Optional		Optional		Optional		Optional																			

plicable to other industries. Whatever revision is necessary to make it pertinent to the range of work to be surveyed should be made.

It will be observed that in filling out this form in most instances only a check mark under the appropriate heading is required. Where a special explanation is needed, reference can be made to a note placed on the back of the form. Some may prefer to use "yes" or "no" answers under some of the headings rather than check marks. This is a matter of detail.

It is important that the analysis be identified by job title or by operation or job number, whichever is used in the organization. The date, and the person or persons responsible for the analysis should be indicated. The date will be useful in determining whether an analysis is up to date, as job content frequently changes, and where the change is significant a new analysis is, of course, indicated.

Without attempting to discuss the preparation of the form in detail, we will use two characteristics appearing on the form to illustrate:

(1) *Eyes*: Indicate by checking under the appropriate heading whether clear vision, average vision, very little vision, or no vision is required. Where no vision is required, obviously it will indicate that an industrially blind person should be able to perform the job. Also indicate whether the highest degree of vision required is required continuously or intermittently in the case of close vision, or, if average or less vision is required, whether the application is normal or only slight. It is to be remembered that what you are getting at is the highest amount of vision required to perform the job, and the degree of application of that amount of vision.

(2) *Work Station Conditions and, closely related Work Station Surroundings*: These refer to conditions inherent in the job or in the job surroundings. It is presumed that management has created as good work station conditions and work station surroundings as is practically possible. These two factors will have to be altered in detail, depending upon the nature of the work in any given industry. Work station conditions are important because some individuals will require inside work, others possibly outside work, others may work either place, some must be protected from dust; reasonable exposure to moisture is not objectionable to most people, but some cannot tolerate it. Work station surroundings are important because some individuals cannot tolerate loud noises or noises of certain types; others are not disturbed by average shop noises; others require relative quiet; some are not able to work as a member of a crew but can work near others if working independently; others do their best in isolated work stations, etc.

While we are not here concerned with the individual, this explanation seems necessary to clarify the reason for the inclusion of these two factors in our job analysis form. The same sort of reasoning applies to operation hazards, which again assumes that no removable hazards will be permitted by management to exist. It also applies to the personal protection required to be used by an operator to safely perform a job.

The same general approach applies to each of the factors.

USE OF FORM: Where the number of jobs analyzed warrants, and the size of the organization permits, it may be found useful to code the various characteristics and use mechanical or other means to facilitate fast finding of jobs having a specific characteristic. To illustrate: The company wants to place a totally blind person. How many jobs exist in the plant where no vision is required, and which are so located as to make the job accessible to the blind person with safety to himself and others? Or if the person has some impairment of vision, some impairment of hands or arms, and must be restricted from wet work and from dust, what jobs in the organization meet these overall requirements? Whether selection is made by a mechanical sort or by visual ex-

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SUMMARY OF PLACEMENT QUALIFICATIONS

NAME _____ KEY NO. _____

BY _____ DATE _____

1 EYES	VISION						PERMITTED APPLICATION										CORRECTION					
							CLOSE															
	1-1 CLEAR		1-2 AVERAGE		1-3 VERY LITTLE	1-4 NONE	1-5 CONTINUOUS		1-6 INTERMITTENT		1-7 NORMAL		1-8 SLIGHT				1-9 WITH					
																	1-10 WITHOUT					
2 EARS (HEARING)	2-1 EXCELLENT				2-2 AVERAGE				2-3 VERY LITTLE						2-4 NONE							
3 HANDS	USE OF HANDS				FINGER DEXTERITY						GRIPPING				FOREARM & WRIST							
	3-1 BOTH		3-2 RIGHT	3-3 LEFT	3-4 GREAT		3-5 NORMAL	3-6 SLIGHT					LIGHT	STRONG	R	L						
											CONSTANT		3-7	3-9	3-11	3-13						
											OCCASIONAL		3-8	3-10	3-12	3-14						
4 FEET ARTIFICIAL LIMB	USE OF FEET										WALKING											
	4-1 BOTH		4-2 LEFT		4-3 RIGHT		4-4 NEITHER				4-5 UNLIMITED				4-6 LIMITED				4-7 NONE			
5 HEIGHT AND WEIGHT	HEIGHT								WEIGHT													
	5-1 TALL			5-2 AVERAGE			5-3 SHORT		5-4													
6 LIFTING PERMITTED	6-1 UNDER 10 #	6-2 OVER 10 #	6-3 OVER 20 #	6-4 OVER 30-#	6-5 OVER 40 #	6-6 OVER 50 #	6-7 OVER 60 #	6-8 OVER 70 #	6-9 OVER 80 #	6-10 OVER 90 #	6-11 OVER 100 #		6-12 FREQUENTLY TIMES PER HR.				6-13 INFREQUENTLY TIMES PER HR.					
7 POSTURE PERMITTED	MUST SIT				REACHING ABOVE SHOULDER				STOOPING													
	7-1 ALL THE TIME				7-4 FREQUENTLY				7-7 FREQUENTLY													
	7-2 PART TIME				7-5 OCCASIONALLY				7-8 OCCASIONALLY													
	7-3 NONE				7-6 NONE				7-9 NEVER													

amination, facilitated possibly by some degree of coding, the next step is to determine which of the suitable jobs provide an available opening preliminary to the actual placement of the individual.

COORDINATION OF INDIVIDUAL CAPACITY WITH JOB ANALYSIS RESULTS: Knowing what the job characteristics are, as determined by job analyses discussed above, is useful only if it is intelligently linked to the capacity of the individual who is to be assigned to a job. In Booklet III—Medical Program of this series the importance of the findings of the examining physician in aiding the sound placement of the individual is discussed. To coordinate these findings with job characteristics in order to insure that an individual is not placed on a job which has inherent requirements which he cannot meet, the following form is suggested for the use of the plant physician.

The method of filling out this form will vary with varying individuals. It is contemplated that the physician will check every item to insure that none is overlooked. It is suggested that "O" be used to indicate those things which the employee may not do, use, be exposed to, or wear—in other words, the things which, if required by the job, are beyond his range of toleration. A check mark (√) should be used to indicate those things which the employee does possess, may do, use, be exposed to, or wear, as the case may be. Each factor, i.e., eyes, ears, etc., is numbered in sequence from the top to the bottom of the form. The detail opposite each factor is given the factor number with a dash-number in sequence. This is to facilitate the physician's clearly identifying and properly relating to the factor involved any explanatory notes which he may find it desirable to attach for the sake of clarity or emphasis.

To illustrate: If the individual had both hands but with the right hand impaired to the extent that he had only limited finger dexterity and light grip, the left hand unimpaired and having normal dexterity and strong grip, hands would be checked as follows: "Both" would be checked under "Use of Hands"; under "Finger Dexterity," "Normal" would be checked with the letter "L" and "Slight" would be checked with the letter "R"; under "Gripping" both "Constant" and "Occasional" would be checked in both "Light" and "Strong" columns, the "Light" column being checked with the letter "R" and the "Strong" column with the letter "L."

This may seem a bit confusing at first glance, but if studied it will indicate possibilities of using this form to interpret to the person responsible for placement the physician's findings in order that these may be properly matched up with job requirements as determined from the job analysis, and thus facilitate placement with a minimum of delay.

Again it is to be emphasized that the form as here presented is suitable for use only with the job analysis form presented herein. If one is modified the other must likewise be modified.

It is also important to note that once this form is prepared for an individual it may be used not only in the initial placement but in any subsequent job transfers involving that individual, *providing* the individual's condition does not change. It is just as important that this form be kept up to date as it is that the job analysis forms for the respective jobs be kept up to date.

CONCLUSION: For the sake of emphasis it should be clearly understood that this presentation is one in a series, and that the series need be considered in toto in determining policies and procedures for the re-employment of ex-service men and women. These are intended to encourage and facilitate re-employment, and if they seem to suggest rather elaborate procedure to that end it is because the authors clearly recognize from experience that our returned service men and women deserve much more than the mere chance to perform a job initially offered. Each deserves the

8 WORK STATION CONDITIONS PERMITTED	8-1 INSIDE	8-2 OUTSIDE	8-3 IN & OUT	8-4 DRAFTY	8-5 DUSTY	TEMPERATURE 8-6 HOT	TEMPERATURE 8-7 NORMAL	DRY 8-8	8-9 SPLASH	8-10 CONTINUOUS	8-11 OTHER	
9 WORK STATION SURROUNDINGS PERMITTED	9-1 LOUD NOISE	9-2 AVERAGE SHOP	9-3 QUIET	RELATION TO OTHER EMPLOYEES: WORK AS MEMBER OF CREW 9-4		NEAR OTHERS BUT IND. 9-5		WORK IN ISOLATED STATION 9-6		9-7 OTHER		
10 OPERATION HAZARDS PERMITTED	MOVING MACHINERY 10-1 PRESSES	10-2 SAWS	10-3 OTHER	10-4 SOLDERING FLUXES	10-5 ACIDS	10-6 MOLTEN METAL	10-7 HEIGHT	10-8 OIL	10-9 OTHER			
11 PROTECTION A-ALLOWED R-REQUIRED P-PROHIBITED	FOR EYES			FOR HANDS		FOR FEET			FOR BODY			
	11-1 EYE SHIELD			11-7 CANVAS GLOVES		11-13 RUBBERS			11-19 CLOTH APRON			
	11-2 PLAIN GOGGLES			11-8 LEATHER GLOVES		11-14 BOOTS			11-20 WATER-PROOF APRON			
	11-3 TINTED GOGGLES			11-9 RUBBER GLOVES		11-15 SAFETY SHOES			11-21 LEGGINGS			
	11-4 WELDING HELMET			11-10 ASBESTOS		11-16 SAFETY TOES			11-22 OTHER			
	11-5 OTHER			11-11 OTHER		11-17 OTHER			11-23 OPTIONAL			
	11-6 OPTIONAL			11-12 OPTIONAL		11-18 OPTIONAL						

REMARKS

best thought of management to insure that he is placed on a job within the range of his capacity and ability, and, if the initial placement is not successful, every reasonable effort should be made to transfer him to a job which will meet his requirements and which, in turn, he can competently fill. These desirable and basically sound ends can be met only by knowing what the job requirements are and what the individual's attributes are, unless one is willing to proceed on a purely trial and error basis. Recognizing that the procedures herein suggested are by no means perfect or foolproof, it is nevertheless believed that an organized and planned approach is far preferable to a trial and error procedure.

While this series has been prepared for the primary purpose of facilitating the re-employment of ex-service men and women, especially those having service-connected disabilities, it is pertinent to point out that it may be found useful in dealing with employment problems generally.

Industrial Health Forum

—This Material is prepared by the Division of Occupational Hygiene, Massachusetts Department of Labor and Industries, Boston—

Re-issue of Shoes

QUESTION: As part of our safety program, we plan to distribute safety shoes to all workers in certain departments. In case the worker leaves our employ, we would like to know if it is permissible to re-issue these shoes to another worker. What is the danger of infection from the re-use of these shoes, and how may they be treated to prevent infection?

ANSWER: The re-issue of shoes has recently been studied, as it is a military problem of some magnitude. Findings of the National Research Council indicate that there is little danger of infection from "athlete's foot" by use of shoes worn by another. Though there has long been the impression that this disease may be passed on through infected footwear, it is now known that practically all individuals have the "athlete's foot" fungus in a more or less quiescent state on their feet, where it develops under favorable conditions of heat and moisture. Prevention of the disease lies in keeping the feet dry and clean by frequent change of socks and use of an absorbent, mildly antiseptic foot powder.

However, from the psychological point of view, it may be advisable to sterilize the footwear by placing the shoes in an air-tight box in which some formalin is allowed to evaporate.

Weil's Disease

QUESTION: Would you tell us the danger from Weil's disease among fish handlers? A number of cases have occurred in a nearby fishery, and we are concerned about the disease spreading, since it is rumored that the illness is occupational. How does one get this sickness, and what can be done to prevent it?

ANSWER: Weil's disease is an infection with an organism which produces in man jaundice, hemorrhage and fever and is frequently fatal. The disease is transmitted by infected rats which excrete in their urine the organism causing the disease. The urine contaminates areas in which people work, and if the germ enters the body, usually through a skin cut, it will produce the disease. It is common in fisheries because they are often infested with rats, and fish handlers frequently have cuts or bruises on their hands.

Prevention of the disease may be accomplished by thorough ratproofing and good housekeeping and personal hygiene of the worker, i.e., proper care of abrasions and lacerations of the hands and thorough cleansing of knives and work benches.

Fumes from Asphalt

QUESTION: We live in the neighborhood of a plant where asphalt is used. The odors cometimes are very noticeable, and some persons say it gives them headaches. Are the gases given off by asphalt dangerous to health?

ANSWER: Asphalt, a bituminous mixture found in natural deposits, is not a substance which is particularly dangerous to health, since, even if heated, the fumes which are given off ordinarily do not contain harmful ingredients. However, it may produce a painful burn and occasionally a dermatitis on repeated exposure. It is more in the nature of a nuisance than a hazard.

Fumes of Moth Repellent

QUESTION: We are beginning to use paradichlorobenzene in considerable amounts and, because of its chemical composition, which suggests toxic possibilities, would like answers to the following questions:

1. Have you seen any cases of poisoning from this material?
2. Can you furnish references which we might find helpful?

ANSWER: Paradichlorobenzene is a toxic substance, but is fortunately fairly safe as used in the household for repelling moths. However, its industrial use may be hazardous. Locally, the material has an irritating effect, and when inhaled in large doses may paralyze the central nervous system. Repeated ingestion or inhalation of small amounts is said to produce liver injuries, loss of weight and later cataract formation. No one of these effects may be expected if concentrated fumes are not breathed.

References which may be helpful are, "Cataract Following the Inhalation of Paradichlorobenzene Vapor," Milton Berliner, M.D., *Archives of Ophthalmology*, December, 1939, and an item which appeared in the *Journal of the American Medical Association*, Page 607, August 22, 1936.

Welding of Cadmium

QUESTION: We are planning to weld cadmium-plated steel and the manufacturers have warned us that we should have special ventilation. Could you advise on what ventilation is needed?

ANSWER: Cadmium is a dangerous substance when volatilized, as it acts as an irritant of the nose and throat and may in some cases produce a pneumonia with fatal results. The hazard may be controlled by proper local exhaust ventilation, but this calls for study of actual conditions of use. It would be advisable to write or telephone the Industrial Hygiene Division of the Health or Labor Department of your state, requesting advice on the ventilation necessary for the type of job you are planning.

Pre-employment Examinations

QUESTION: At the request of management, I am about to do pre-employment examinations of a group of foundry workers. Would you be kind enough to tell me what laboratory examinations are indicated and what particular illnesses I should look for?

ANSWER: All workers entering a dusty trade which requires heavy manual labor, such as foundry work, should be studied for evidence of previous exposure to mineral dust and for cardiovascular disease. The examination should include a complete occupational and systemic history, physical examination and a roentgenogram of the chest, since only by x-ray can early pneumoconiosis be demonstrated. Eye examination, urinalysis and serology are desirable, but not absolutely necessary.

Toxicity of Silver

QUESTION: What is the toxicity of silver? I know that the colloidal silver compounds are used medically, but we have had some debate regarding the actual toxicity of the silver ion. Could you give us any references on this subject?

ANSWER: It is difficult, if not impossible, to obtain an appreciable concentration of silver ions in the circulation. This is due to the fact that silver in the body reacts immediately with chlorides or protein and is precipitated. Silver, when it enters beneath the skin or mucous membranes, remains at the site. However, silver may become generalized if inhaled or ingested.

The silver deposited in the tissues

darkens on exposure to light and produces the clinical condition of "argyria," which is characterized by a metallic discoloration of the skin and hair. The precipitated silver is inert and produces no symptomatology other than abnormal pigmentation.

Silver nitrate, taken internally, acts as an acute poison and produces a form of shock, ending frequently in a hemorrhagic dysentery and death.

Reference

HEIMAN, H.: Toxicity of Metallic Silver. *Industrial Bulletin*, February, 1943, pp. 81-83.

Problems in Industrial Ophthalmology

—Abstracts of Papers at a Meeting Arranged by the Joint Committee on Industrial Ophthalmology, October 8, 1944, Chicago—

DR. A. C. SNELL, of Rochester, New York, presided at the meeting, with the following program:

"Eye Protective Equipment" (illustrated—GLEN H. HARRISON, M.D., Member of the Joint Committee on Industrial Ophthalmology.

"The Connecticut Experience with Eye Problems in Small Industries"—JOSEPH LO-PRESTI, M.D., Assistant Surgeon (R) U. S. Public Health Service, on assignment from U. S. Public Health Service to National Society for the Prevention of Blindness.

"Illumination and Industrial Visual Tasks" (illustrated)—ALLEN K. GAETJENS, Research Engineer, Nela Park, General Electric Company, Cleveland.

"Placement of Blind in Industry" (illustrated)—HAZEL HURST, President, Hazel Hurst Foundation, Los Angeles, California, Placement Officer for blind at Lockheed Aircraft, Los Angeles, California. (Introduced by MEYER WIENER, M.D., Coronado, California, Ophthalmic Consultant to Vice Admiral McIntyre, Surgeon General, U. S. Navy.)

DR. GLEN H. HARRISON, in speaking on "Eye Protective Equipment," gave a general review of statistical material with reference to eye protection and the results. Numerous lantern slides were used to illustrate the statistical material, and also photographs of protective devices and protective glasses were shown, with emphasis on newer developments.

DR. JOSEPH LO-PRESTI discussed the subject "The Connecticut Experience with Eye Problems in Small Industries."

Reference was made to DR. C. P. TOLMAN'S survey, which was reported last year. Similar forms were used in the Connecticut survey at 30 plants, with an appraisal form which was illustrated by lantern slides. Arrangements were made for interviews with management, physicians, nurses, foremen, ophthalmologists, and workers.

In general, the survey indicated lack of proper tests and medical supervision of tests, as well as lack of occupational knowledge on the part of those doing tests. Eye protection throughout the entire survey appeared to be fairly well done.

It was found that approximately 75% of the plants had physicians on call or on part-time; approximately 60% of nurses were without medical supervision; and about 100% of the nurses were without ophthalmological supervision. It was concluded that there was great need in these small plants for ophthalmological and medical supervision.

DR. L. HOLLAND WHITNEY of the Sperry Gyroscope Company, discussed, in brief, the results of DR. LO-PRESTI'S survey, and described briefly large plant services with which he has come in contact.

MR. ALLEN K. GAETJENS, speaking on "Illumination and Industrial Visual Tasks," stated that it was necessary to put the engineering and control of illumination on a scientific basis. Definitions were given of the terms "foot candle"—"lambert"—"brightness contrast"—and "brightness ratio." Two phases were emphasized: (1) the improvement of visibility without increased amount of light and the improvement of contrast without increased amount of light; and (2) eye comfort. A demonstration showed the elements of these phases of proper industrial lighting.

MISS HAZEL HURST concluded the program, in the discussion of "Placement of Blind in Industry."

An explanation was given of the work of the Hazel Hurst Foundation at Pasadena, California, and special emphasis was put on the attitude of blind people. These people do not wish to be called "handicapped," but would rather refer to their blindness as being one of many limitations which are exerienced by every person. Numerous examples were given of sighted persons working alongside of blind persons, the results being comparable as to efficiency, speed, and accuracy. There were also favorable comparisons made between blind and sighted persons with reference to absenteeism, sickness, spoilage, and labor turnover.

Systematic Inorganic Chemistry

Review by

WILLIAM D. McNALLY, M.D.

A TEXT and reference book on Systematic Inorganic Chemistry by DON M. YOST, Professor of Inorganic Chemistry, California Institute of Technology, and HORACE RUSSELL, JR., Instructor in Chemistry, California Institute of Technology; published by Prentice-Hall, Inc., New York. $6.00.

THIS BOOK is devoted to the inorganic chemistry of non-metallic elements of the fifth and sixth groups of the periodic system. The subject matter is divided into 11 chapters, covering 397 pages, plus Appendices.

The authors, in writing this text have departed from the usual method of writing books on inorganic chemistry and have included all the modern developments of physics and chemistry. They have given a very thorough discussion of the chemical element or compound including the spectroscopic, structural, thermodynamic, chemical kinetic, and nuclear properties. They have also included the chemical facts that one finds in simple experiments with test-tubes, beakers and flasks, giving many illustrations, graphs and references. The authors realized that, in the thorough manner in which they were covering the subject, it would take volumes to cover the field of inorganic chemistry, therefore, they selected the non-metallic elements of the fifth and sixth groups of the periodic systems.

These elements and their compounds, besides being of great practical and theoretical interest in themselves, exhibit, in their properties and reactions, characteristics that are common to many other substances both inorganic and organic.

This text is not for the beginning student but more for the research man or advanced chemist. While the text references to the literature are not regarded as exhaustive or complete, it is stimulating to the student, as it provides references which will arouse his interest in some phase of inorganic chemistry, and he will continue his library work from text references as well as the bibliography.

Golden State Hospital

—Industrial Clinic—

C. O. SAPPINGTON, M.D., Dr. P.H.

SINCE 1920 the Golden State Hospital at Los Angeles, California, has been offering a special service for the diagnosis and treatment of industrial cases. Its present medical director, DR. C. E. EARLY, has always been interested in industrial medicine and surgery, but special emphasis has been given to this work since the establishment about five years ago of a Division of Occupational Diseases, of which DR. RUTHERFORD T. JOHNSTONE has been, continuously, the director.

The personnel of the Clinic is particularly interested in the innumerable small plants and industries in southern California and a special service is offered for such concerns. Because of the organization of the Clinic and its departmental activities, it is able to

provide for the small plant a medical program comparable to a great many found in the larger industries.

The accompanying chart will show the organizational plan, which needs some brief comment.

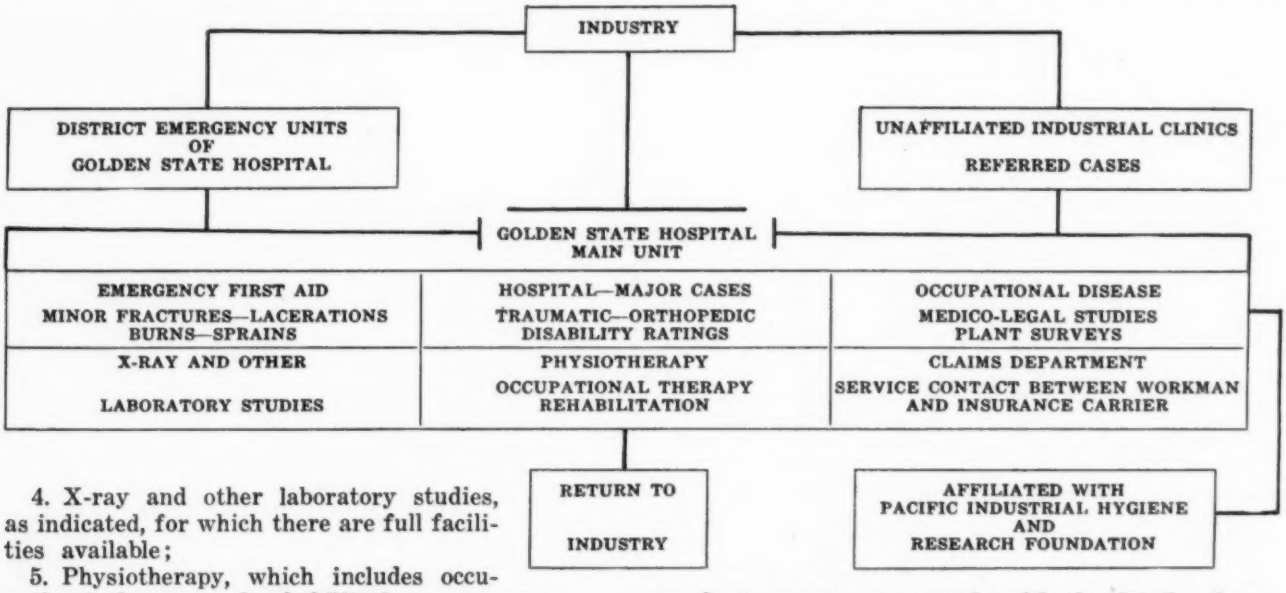
The source of all the patients, whether outpatients or hospital in type, is the tremendous number of industries in the southern California territory. These may be directed to district emergency units of the Golden State Hospital, which are situated in various areas throughout municipal Los Angeles and its environs, or the patients may go to unaffiliated industrial clinics and become reference cases which are sent to the main unit of the Golden State Hospital.

The major services rendered at the main unit are:

1. Emergency first aid; including minor fractures, lacerations, burns, sprains, and similar injuries;

2. Major hospital cases, which include the effects of all kinds of trauma and also one of the major groups of orthopedic cases and in which disability ratings are given;

3. The work of the Division of Occupational Diseases, which includes work done on plant surveys and medicolegal studies;



4. X-ray and other laboratory studies, as indicated, for which there are full facilities available;

5. Physiotherapy, which includes occupational therapy and rehabilitation measures;

6. The work of the claims department, in which there is a service contact maintained between the workman and the insurance carrier.

From the diagnosis, treatment and rehabilitation measures of these various departments the individual is returned to industry.

Affiliated with the Golden State Hospital is what is known as the Pacific Industrial Hygiene and Research Foundation. At the present time, a well-appointed industrial hygiene laboratory is housed in the main unit building of the Golden State Hospital, and the staff looks forward to obtaining a fellowship for this industrial hygiene and research foundation; it is expected that a fellowship will be established providing for the spending of time in the industrial hygiene laboratory, and also in the occupational disease and orthopedic departments.

From the non-affiliated industrial clinics come patients from all over southern California, from as far north as inland Bakersfield and the mining country, and from as far south in one direction as Santa Barbara on the coast, and, in another direction, as San Diego. Physicians situated in these places depend upon the outpatient clinic for diagnoses of occupational diseases and for the treatment of their major cases, which are represented by severely traumatized individuals and those particularly of orthopedic type. The service, therefore, is not limited to the city of Los Angeles nor to Los Angeles County.

An interesting and unique feature of the Clinic is the compensation department, under the direction of Miss Mary Smith who has had years of experience in this work. This department functions as a counselor and coordinator between the injured man and the insurance carrier, a service which is rendered without charge to the workman or the carrier. For example, when a compensation check is overdue and the workman is unable to obtain action, or does not know how to do this, the insurance company is informed and advised as to prompt action; the necessary papers are filled out for the worker; and a constant check-up is kept on the clerical force to see that the right carrier is notified immediately upon the arrival of the injured person at the clinic. It is believed that all of this maintains good relationship between the physician, the worker, and the insurance carrier.

The records of the Clinic show an active list of between 2500 and 3000 employers names, all of which are kept on separate records with the details of employees of each company who have become Clinic patients. There is considerable range in the size of these organizations, the smallest being from 10 to 12 persons, and the largest having 30,000 employees.

The attendance at the Clinic has averaged between 13,000 and 14,000 new cases annually.

As to surgical conditions treated, the records show lacerations and abrasion of fingers; foreign body in the eye; injuries to feet and legs, including bruises and puncture wounds; fractures of all description; lame backs; hernias; and general strains and sprains.

Of the occupational disease types seen in the Clinic, the dermatoses lead, as would be expected; there are also examples of cases of lead poisoning, poisoning by chlorinated solvents; an occasional case of silicosis; and cases of cadmium poisoning occasionally, as well as poisoning by arsenic and mercury.

Examinations are regularly done by the Clinic for placement purposes, sometimes at the rate of 1000 at a time; and there are also continuous routine examinations for periodic purposes and especially periodic examinations in lead exposures. Another feature of the Clinic is compensation examination for hernia, and malarial examinations on foreign industrial services.

The hospital is equipped for all kinds of diagnosis and treatment, and has available from 80 to 100 beds for in-patients.

It has been found that there is considerable advantage in having an outpatient industrial clinic associated with hospital facilities, especially in the major cases which need hospitalization and from the viewpoint of doing thorough laboratory work and diagnostic procedures on ambulatory industrial patients.

The Place of Tantalum in Surgery

C. T. OLSON, M.D.,
Medical Director,
Fansteel Metallurgical Corporation

I HAVE been asked to discuss "The Place of Tantalum in Surgery" before this gathering. I want to express my appreciation of this invitation, but before entering into the discussion I think it is worth while to make certain explanations. The company with which I am associated is a producer of pure tantalum. The primary interests of the company are metallurgical. When the surgical profession picked up tantalum as an addition to its armamentarium, our company decided that the best interests of that profession could be served by transferring all of the field of surgical tantalum to the Ethicon Suture Laboratories, a division of Johnson & Johnson, which is in intimate contact with the profession. At the present time all of the clinical research, development, and promotion of surgical tantalum are in the hands of the Ethicon Suture Laboratories.

I speak to you not as a research man nor as a promoter of surgical tantalum, but as one industrial surgeon to a group of industrial surgeons. All of the statements I make and all of the material I use will be taken from technical data sheets, surgical literature already published, and my own personal observations of industrial cases where tantalum has been employed. May I stress the fact that our company is simply the producer of tantalum, and that the promotion of surgical tantalum is in the hands of Ethicon Suture Laboratories.

However, I have been in the fortunate position of having available to me for some time past all of the tantalum I might want to use in the handling of our industrial cases, and necessarily I have become quite familiar with various applications of this metal in the field of surgery. It is for this reason that I feel justified in taking up your time on this subject which, as you know, is one of the very prominent subjects now under discussion in the surgical profession. One can hardly attend a medical meeting nowadays or read a surgical journal without finding some mention of this new surgical material, tantalum. The military surgeons have embraced tantalum because of its ability to assist healing in difficult wound cases. Just recently, tantalum which has been on the restricted list has been made available to the civilian surgeons who are exhibiting enormous interest in its possibilities.

The history of tantalum goes back to 1803 when Ekeberg noted it as an element and gave it its name because he could not separate the element from its tightly locked compounds. In 1903 von Bolton, of Germany, produced the metal in a ductile workable form. He was principally interested in tantalum wire for incandescent lamp filaments, but also found that its resistance to corrosion adapted it to dental and surgical instruments. It was used as a lamp filament from 1903 to about 1911, when tungsten supplanted it. In 1922, Dr. Clarence W. Balke, then Director of Research of Fansteel, developed methods of successfully refining pure tantalum on a commercial scale. Tantalum has found its greatest field of usefulness in electronics, but it is used for many other purposes. It was not until 1936-1937 that surgeons Burch and Carney, of Vanderbilt University, and Gerald B. Burke, of Vancouver, British Columbia, working independently, found that tantalum could be applied with great benefit to surgical problems.

THE production of tantalum is a complicated metallurgical process involving the extraction of the tantalum by electro-chemical methods in the form of a fine powder which is then pressed into bars and sintered in high-vacuum furnaces. The bars are then cold worked with annealing at different stages in vacuum furnaces to remove the work hardness. The end product is in the form of rods, sheet, foil, or wire. Tantalum is an element, number 73 in the periodic table, having an atomic weight of 180.9. At normal temperature (20° C) and atmospheric pressures it has a density of 16.6, which means that it is roughly twice as heavy as steel and one and one-half times as heavy as lead. It is a bluish-white metal with a strength quite similar to mild steel, unannealed tantalum being comparable to cold-rolled steel, while annealed tantalum may be compared to annealed steel. It is quite ductile and is comparable to nickel in its ability to be drawn, stamped, or formed into complicated shapes. It becomes work-hardened at a rate much lower than most metals. It may be machined with ordinary steel tools, using carbon tetrachloride as a cutting compound. It welds perfectly to itself and certain other metals by electric spot, butt, seam, and roller processes. It may be arc-welded to itself by a very special process. It may be hardened by a special process to any desired degree from 150-600 Brinell.

The chemical properties of tantalum tend to make it very valuable to the surgical profession.

CORROSION Resistance of Tantalum: The data on the following page are based on tests made in the Fansteel laboratory for the time duration and at the temperatures noted.

In general, it may be said that, so far is known, under normal body temperatures and atmospheric pressures no organic acid, salt, gas, alcohol, ketone, aldehyde or ester has any effect upon tantalum with the following exceptions, namely, reagents which may contain fluorine, free SO_3 or strong alkalis. The only acids with which tantalum must be considered with caution are hydrofluoric, fuming sulphuric, sulphuric, and phosphoric, the latter two only at high concentrations and temperatures. It has an excellent resistance to weak alkalis and to very dilute solutions of strong alkalis as long as local concentration can be avoided. It is inert to salts, dry, wet, or dissolved, excepting those which contain or hydrolize to strong alkalis. Hypochlorites do not affect it unless they are strongly alkaline. The same is true of all chlorides, bromides and iodides.

As to gases, at temperatures below 150° C nearly all corrosive gases have no effect upon tantalum. Fluorine and hydrogen, however, particularly if under pressure, are exceptions. In general, it may be stated that, for all temperatures under 175° C, tantalum does not combine with gases. At higher temperatures it reacts with other gases, and at very high temperatures it will combine or react with most of the elements. Mercury and the noble gases apparently do not com-

Presented at a meeting of the CHICAGO SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY, October 30, 1944.

SUBSTANCE	TIME	TEMP. DEG. C.	% LOSS IN WT. PER MO.	DEPTH OF CORROSION (INCHES PER YR. X 10^{-5})	RATING
Hydrochloric Acid, HCl Conc.	4.5 mo.	19-26	None	None	Excellent
Sulphuric Acid, H_2SO_4 Conc.	4.5 mo.	19-26	None	None	Excellent
Nitric Acid, HNO_3, Conc.	4.5 mo.	19-26	None	None	Excellent
Phenol Sat. Sol. H_2O, C_6H_5OH	4.5 mo.	19-26	None	None	Excellent
Aniline C.P. $C_6H_5NH_2$	4.5 mo.	19-26	None	None	Excellent
Cleaning Solution, H_2SO_4, $K_2Cr_2O_7$	4.5 mo.	19-26	None	None	Excellent
Cleaning Solution, H_2SO_4, $K_2Cr_2O_7$	3 mo.	150	.013	.4248	Excellent
Iodine, KI-H_2O Sat. I_2	4.5 mo.	19-26	None	None	Excellent
Bromine (Liq.) Br_2	4.5 mo.	19-26	None	None	Excellent
Barium Hydroxide $Ba(OH)_2$ Sat.	4.5 mo.	19-26	None	None	Excellent
Ferric Chloride, $FeCl_3$ Conc. Sol.	4.5 mo.	19-26	None	None	Excellent
Muriatic Acid, HCl (Com'l)	4.5 mo.	19-26	None	None	Excellent
Stannic Chloride, $SnCl_4$ Sol. (Sat.)	4.5 mo.	19-26	None	None	Excellent
Acetic Acid, $HC_2H_3O_2$ Glacial	4.5 mo.	19-26	None	None	Excellent
Lactic Acid 85% Solution	4.5 mo.	19-26	None	None	Excellent
Oxalic Acid, Sat. Sol.	4.5 mo.	19-26	None	None	Excellent
Acetone $(CH_3)_2CO$	4.5 mo.	19-26	None	None	Excellent
Sodium Chloride, NaCl Sat. Sol.	3 mo.	100	None	None	Excellent
Potassium Chloride, KCl Sat. Sol.	3 mo.	94	None	None	Excellent
Sodium Tungstate, Na_2WO_4-$2H_2O$ (Sat.)	3 mo.	97	None	None	Excellent
Silver Nitrate, $AgNO_3$ 50 gms. per 100 cc. Sol.	3 mo.	102	None	None	Excellent
Oxalic Acid, Sat. Sol.	3 mo.	96	.03	.9912	Excellent
Phosphoric Acid, H_3PO_4 Conc.	3 mo.	145	.014	.4673	Excellent
Chromium Plating Solution, CrO_3 in dilute H_2SO_4	3 mo.	98	.007	.236	Excellent
Sodium Sulphate, Na_2SO_4 Sat. Sol.	3 mo.	101	.007 gain	Slight tarnish	Excellent
Sulphuric Acid, H_2SO_4 Conc.	3 mo.	147	.013	.4248	Excellent
Sulphuric Acid, H_2SO_4 Conc.	1 mo.	175	.324	1.274	Good
Sulphuric Acid, H_2SO_4 Conc.	1 mo.	200	3.7	152.9	Fair
Sulphuric Acid, H_2SO_4 Conc.	6 hr.	250	71.2	.2832	Poor
Sodium Hydroxide, NaOH 5% Sol.	2 mo.	100	1.13*	38.23	Fair
Potassium Hydroxide, KOH 5% Sol.	2 mo.	100	.01	.3398**	Good
Sodium Hydroxide, NaOH 40% Sol.	2 days	110	Completely corroded		
Potassium Hydroxide, KOH 40% Sol.	2 days	110	Completely corroded		

*Slight Coating. **Forms Protective Coating.

bine with tantalum up to the melting point, which is 2996° C.

We may, therefore, call these things to your attention. Tantalum is a pure element—not an alloy. It is completely resistant to corrosion and chemical attack except as noted above. It is as strong as any material which need be applied. It is not weakened by corrosion. It is completely homogenous and contains no impurities which may set up local electrolytic action. It is unchanging in its several properties because no product of corrosion can be formed to produce low-conductivity surface film. It is capable of being drawn, stamped, hammered, formed, or welded without introducing "strain areas" which may become centers of local action. It is capable of being hardened through a wide range without losing any resistance to chemical attack.

DOWN through the ages the surgeon has been looking for the ideal metal which could be implanted in the body with benefit. Venable and Stuck (*Surg., Gynec. & Obst.* 76: 297-304, April, 1943) have reviewed the history of varied metal appliances in surgery running through the gamut of gold, silver, iron and steel, aluminum, magnesium, brass and various alloys. In 1936 they performed a number of animal and chemical experiments in which they found definite evidence that all of the metals commonly used in surgery were subject to electrolytic activity in body fluids. They state, "As new industrial alloys have been developed and tried as buried surgical appliances in the body, it has been found that they succeeded only if they were passive or free of electro-activity in normal human serum."

Bothe and Davenport (*Surg., Gyynec. & Obst.*, February 1, 1942, Vol. 74) concluded that "electrolysis is not the primary cause of unfavorable bone reactions. The primary causes are determined by physical and chemical properties of the metal itself. Solubility and the degree of toxicity of the dissolution products appear to be the chief factors. If electrical potentials play no part in inciting reaction it seems safe to assume that the unfavorable reactions seen in alloys are due to the presence of toxic metals such as nickel, copper, or manganese in them." And then they go on to state that tantalum may prove to be the metal of choice when sufficient data on it have been accumulated.

In an article in *Canad. Med. A. J.* (43: 125-128, 1940) Dr. Gerald L. Burke discusses the problem of corrosion, particularly as applied to surgical materials. After working with tantalum for one and one-half years, he makes this statement, "From the foregoing brief and somewhat simplified discussion of corrosion and from the consideration of the properties of the metal, one would judge that in a nearly neutral system, such as the human body, there should be no foreign body reaction to tantalum; it should be absolutely inert. This judgment has been borne out in our experience." In this same article, Dr. Burke reported using screws and bone plates in fractured and unfractured tibiae and femora of six dogs and rabbits, removing them in periods ranging from three weeks to three months. "In each case the screws were held so tightly by the bone that considerable effort was necessary to unscrew them. There was no macroscopic, microscopic, or x-ray evidence of bone or soft tissue irritation." He also reported using tantalum wire as a skin suture in 34 patients and made the following statement: "It has proved to be an incomparable skin suture. A few weeks after removal of the suture it is difficult and often impossible to detect where it passed through the skin. These closures are in striking contrast with the constant blobs of scar tissue that usually line the edges of the wound." In 11 cases he used tantalum wire as a subcutaneous suture; in three cases as a Bunnell tendon suture; in one case each a fractured patella and a fractured medial condyle of the humerus were wired; and two plates were used in the internal fixation of fractures. Then he makes the following statement, "So far we have been unable to unearth the slightest sign of objection on the part of any tissue to the presence of tantalum."

In *Surgery*, November, 1942 (12: 5, 791-797) Robert H. Pudenz, of the Department of Neurology and Neurosurgery of McGill University and the Montreal Neurological Institute, reports on the use of tantalum

clips for hemostasis in neurosurgery: "These findings offer additional evidence that tantalum does not irritate tissues. In all of the experiments the reaction to the metal, when in contact with the meninges or nervous tissue, was a minimal encapsulation by fibroblasts and/or neuroglia fibrils, depending on the location. In contrast, silver has invariably provoked an intense inflammatory reaction, leading ultimately to investment in dense collagenous connective tissue. The character of this tissue reaction to silver is not unlike that of cerebral abscess formation. In view of the intensity of the reaction to silver, we are convinced that the replacement of this metal by tantalum is a considerable refinement in technique."

The tantalum sheet was selected for cranioplasty by several workers, namely, Fulcher, Penfield, Cone, Spurling, and Pudenz. In *J.A.M.A.*, February 13, 1943 (121: 478-481), Pudenz reports on the repair of cranial defects with tantalum, and summarizes his findings in the following words: "These experimental studies indicate that tantalum is a satisfactory alloplastic material for the repair of cranial defects. It has the desirable qualities of non-corrosiveness, inertness in tissue, non-absorbability, absence of toxic ingredients and malleability. This last quality enables the surgeon to form the flat tantalum sheet to the desired contour at the operating table. In view of these characteristics, the use of this metal should be considered in the repair of many of the cranial defects which will inevitably occur as a result of craniocerebral injury in the present war, and particularly in those repairs in which a satisfactory cosmetic result is of utmost importance."

In an article in *J. Neurosurgery*, March, 1944, Lt. Col. R. G. Spurling discusses the technical considerations in the repair of peripheral nerve injuries. He describes a technique where the anastomosis is made with fine tantalum wire and the site of the anastomosis is surounded by a small cuff of tantalum foil. It is my understanding that this technique is one of the methods of choice at the present time in military surgery where 15% of the extremity wounds are complicated by injuries to large nerve trunks.

Many case reports are already in the literature of tantalum implants for orthopedic procedures, plastic repairs, and many other uses. I have cited these references to the literature merely to suggest the progress which has already been made and which is in store for tantalum. With each succeeding month that goes by you will be confronted with more and more reports on the successful use of tantalum.

Some criticism about tantalum implants is appearing because of disastrous results following diathermy applied in the field of the implant. Such results are not peculiar to tantalum but are to be expected whatever the nature of the metallic implant. It should be the function of the physician or technician using diathermy to determine in advance the presence of a metallic implant, just as it is the duty of an anesthetist to be sure the mouth is free of loose foreign bodies before administering a general anesthetic.

AS INDUSTRIAL surgeons you may wonder where tantalum enters the picture for you. For this reason, I wish to tell you where I find it of most benefit. Inasmuch as I do not have occasion to do open bone work, I do not feel qualified to discuss the use of tantalum plates and screws. There are two fields, however, where I find tantalum of great help, namely, as a suture material and as a wound dressing.

As I stated earlier, tantalum wire is very ductile and quite easily handled. It can be drawn down to very fine diameters. In fact, it has been drawn down as fine as .001 inch. However, the sizes found most useful for the surgeon are as follows:

Wire Diameter	B & S Gauge	Cat Gut Gauge
.003 in.	40	6-0
.005 in.	36	5-0
.007 in.	33	4-0
.010 in.	30	000
.015 in.	26	0
.020 in.	24	2
.025 in.	22	4

The tensile strength and the percentage of elongation of the various sizes have been determined by our metallurgical laboratory. One set of test results is shown in the following table:

Diameter	Breaking Strength in Pounds		Percentage Elongation
	Straight-Pull	Surgeon's Knot	
.003 in.	.54	.44	12.6
.005 in.	1.7	1.3	11.7
.007 in.	2.5	2.1	15.7
.010 in.	4.6	4.2	25.8
.015 in.	10.4	8.6	14.2
.020 in.	23.1	22.1	13.7

These tests were run on a motor driven Amthor testing machine on sizes up to 15 mils. The larger size was tested on a small Olsen testing machine. A 10-inch gauge length was used. The tests took approximately 20 seconds for completion. The surgeon's knot strength is fairly close to the straight-pull strength. In testing for knot-strength, the knots which were tied securely and pulled fairly tight did not come untied before breaking.

I have used tantalum wire suture material on all of our hand injury cases for the past year and have a large series of them to look back upon. I have used the tantalum wire for both buried and cutaneous suturing. In this fairly large series of cases I have not yet seen any evidence of anything but minimal tissue reaction. I have not yet had a single infection in any of the cases where tantalum wire was used in these hand cases, which, to me, is quite remarkable because I am sure you will appreciate how difficult it is to obtain bacterial and physical cleanliness in working with the hand of the factory worker.

The point I wish to stress is that, so far as I know, there is no possibility of any biologic stimulation from the use of tantalum. The value of the tantalum rests on its inertness. The theory on which I carry forward my work in handling these wounds is that I do not want to interpose any barriers to natural wound healing. I believe that the optimum healing takes place when the tissue cells are not hindered in their natural reparative functions.

I proceed, therefore, to exercise all of the precautions possible to attain a high degree of mechanical cleanliness of the wound area by gentle washing with bland soap and water. I attempt to minimize bacterial contamination by working in clean surroundings, with the surgeon, the nurse, and the patient properly masked. I try to eliminate all of the devitalized tissue by thorough debridement in order that there shall not be too great a lag period due to the necrosis, absorption and infection of this devitalized tissue in the wound. On October 19, 1944, Brig.-Gen. Rankin, speaking before the International Postgraduate Medical Assembly, said that this phase of the handling of wounds has proved to be one of the most important steps in this war, just as we had discovered it to be in the first World War.

I try to handle the tissues as gently as possible,

avoiding mass ligation and yet attaining a high degree of hemostasis. I try to get as accurate apposition of the tissue without tension as possible. The tantalum wire is chosen in the smallest possible size which can be used for the particular operation. I personally like to use sizes smaller than the average surgeon, and I think as the average surgeon becomes more adept in handling the wire he will prefer the smaller sizes. I use no chemicals of any kind in the preparation of the wound except minimal amounts of ether to remove oil and grease and then follow up with bland soap and water. Where I have been able to get the wounds within the so-called safe period, that is, from four to six hours after their occurrence, I do not use chemotherapy of any kind. In dressing wounds I have used tantalum foil as the material which covers the wound area. Gauze is then put over the foil and fairly snug bandages are used. Wounds are not looked at for a period of seven days. I used to allow the wounds to go for nine to 10 days before looking at them, but I find with our present technique it is perfectly safe to remove the dressings at the end of seven days, as there has always been remarkably good healing by that time.

The second place where I like to use tantalum is in the dressing of burned or denuded areas of the skin. In our particular plant we have not had to contend with major burns covering large areas of the body surface. Most of our burns are small in area, very seldom covering an area greater than six inches in diameter. However, the type which we have to treat is not the usual thermal burn but is due to acid, and particularly hydrofluoric. Now any of you who have ever had occasion to deal with hydrofluoric acid burns know that there is a tendency toward a progressing degenerating action which persists for several days under the usual forms of treatment and that burns which, when first looked at, appear to be very minor, have a tendency to wind up as second degree burns or even with loss of full thickness of the skin. I have attained a high degree of success in treating burns of this nature by applying much the same principles to them that I do to sutured wounds. In the first place, of course, it is necessary to remove whatever acid is on the skin, and this I do by the profuse use of water, all burns getting a minimum soaking of 30 minutes up to two hours for the more serious ones. Diluting the acid with water is as good a method as I know of for diluting the acid and at the same time leaving the tissue in condition to start healing. I have found when I have attempted some of the numerous methods advocated for the neutralization of burns, and particularly those calling for the hypodermic injection of such substances as calcium gluconate, that invariably I have had full thickness sloughs. I believe from my handling of these burns that when radical neutralization of the acid is attempted rather than diluting with water, enough thermal reaction is set up either totally or partially to devitalize the tissue. It is my firm belief that these areas which have been partially devitalized by the reaction of the acid are very fertile fields for bacterial contamination, and that wounds which might have remained first degree burns if protected against bacterial contamination frequently become second and third degree burns because of this bacterial contamination.

My technique, therefore, in handling burns after the proper dilution with water is mechanically to cleanse and debride the area, using cotton balls, bland soap and water, with everybody involved in the operation properly masked. Sterile sheets of foil are then placed against the burned area and over the foil goes sterilized mechanics waste, and then there is the application of elastic adhesive dressings with enough pressure to give the proper compression. The optimum pressure desired with a compression dressing is that pressure which supports the venous return rather than reduces it.

When I first began using foil dressings over burned areas I would leave the dressings on for 12 days before looking at them; then I reduced the time to nine days; and now I remove the dressings at the end of seven days. At the end of seven days when these dressings are taken off there is a fine glistening surface over the area which has become eroded by the burn, and the continuity of this film is complete from edge to edge. Previous to using foil as a burn dressing I was in the habit of using the sterile vaseline gauze as advocated by Blair, Brown, Koch, and others, but it is my conviction that the rate of healing is much more rapid under the tantalum foil than it is under vaseline gauze. I have never made histological studies concerning whether this film is epithelization or whether it is a deposit of collagen, but from a clinical standpoint it must be good skin because there is no evidence of scar tissue in these areas later on. Many of our burns occur in areas which are difficult to heal. I refer particularly to the acid burn which occurs on the dorsum of the foot where dripping acid is apt to collect and concentrate, owing to the top edge of the shoe holding it back temporarily. For example, on October 10, 1944, I had such a case to handle where the solution was one that contained 200 pounds of hydrofluoric acid in 800 gallons of boiling hot water. This involved both feet, and there was the typical bleb formation of second and third degree burns. These burns were handled in the manner described above, the first dressings being removed seven days after the burns had occurred at which time there was this glossy film all over the entire burned area, and the employee was back to work two weeks after the burn had occurred with an intact epithelial surface all over the burned area. Cases like these are hard to believe, but I have had other men look at these burns and they agree that the rate of healing is almost miraculous. The same thing occurs when tantalum foil is used over an area of skin where partial thickness has been lost either as a result of an accident or as in a donor site. If the denuded area is free of bleeding, much the same picture obtains there. It is a matter for speculation as to what happens, but at the present time it is my personal opinion that when the smooth foil is placed against the denuded area with a proper degree of compression, the migration of the epithelial cells takes place with a minimum of lost motion.

All of this work with foil may be of only academic interest, but I do believe there is a future for it because it is, so far as I know, the only material which can be placed against a raw surface and cause no irritation. If the cells are not subjected to irritation, evidently the rate of healing can be stepped up beyond the limits which we think are natural at the present time.

So far as the brain surgeon, the orthopedic surgeon, and the peripheral nerve surgeon are concerned, tantalum does not have to be the subject of much debate. During this war it has done a magnificent job in restoring many of our mutilated boys to a normal existence. As I understand it now, tantalum is available to the civilian doctor and it behooves him to look into its possibilities. So far as I am personally concerned, it is a material which definitely belongs in the armamentarium of the surgeon who wishes to do precision work.

Melvin N. Newquist, M.D.

Loyal A. Shoudy, M.D.

Henry S. Brown, M.D.

Edward C. Holmblad, M.D.

The 1945 "Third War Conference" on Industrial Health

—Industrial Physicians and Surgeons, Industrial Hygienists, Industrial Nurses, Chicago, April 23-28, 1945—

THE response to the questionnaires sent to the members by the Program committee regarding the 1945 Annual Meeting Program was most gratifying in that over 100 were returned, with 183 suggestions offered, of which about 30% desire general industrial, pre-employment and pre-placement topics; about 30% wish industrial medical and surgical subjects including rehabilitation; about 30% are chiefly interested in occupational diseases and industrial hygiene; and about 10% emphasize plant visits and miscellaneous topics. This composite expression from members will serve as a valuable guide for the Program committee, which is already functioning. Further suggestions will be welcomed, by postcard or letter; address DR. E. C. HOLMBLAD, 28 E. Jackson Boulevard, Chicago 4.

The Program Committee Meeting in Chicago, September 12, was attended by DR. MELVIN N. NEWQUIST, general chairman for the 1945 Annual Meeting, and co-chairmen DRS. C. O. SAPPINGTON, O. A. SANDER, and M. H. KRONENBERG; DR. FRANK P. HAMMOND, Chairman of the Banquet Committee; DR. H. GLENN GARDINER, Chairman of the Committee on Scientific Exhibits

Frederick W. Slobe, M.D.

and Scientific Awards, and DRS. WILL F. LYON and CHARLES DRUECK, JR., members of that committee; MAJ. ALLEN D. BRANDT and MR. WARREN A. COOK, representing the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION; MISS VICTORIA STRALKO, from the AMERICAN ASSOCIATION OF INDUSTRIAL NURSES; and DR. F. W. SLOBE, President of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, and DR. E. C. HOLMBLAD, Managing Director of that organization. Following the meeting, DR. NEWQUIST said:

"The enthusiasm manifested by the representatives attending the Program Committee meeting and the tentative plans and arrangements agreed upon, bespeak a most interesting and successful meeting for 1945, April 23-28, at the Drake Hotel, Chicago.

"The NATIONAL CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS will meet on Monday and Tuesday; and the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION on Wednesday and Thursday, holding a joint meeting on Wednesday afternoon with the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. The AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS will meet on Wednesday, Thursday and Friday, clinics being held at local hospitals on Wednesday and Thursday mornings and a joint meeting with the AMERICAN ASSOCIATION OF INDUSTRIAL NURSES scheduled for Friday afternoon. The AMERICAN ASSOCIATION OF INDUSTRIAL NURSES will meet on Friday and Saturday, with certain business and committee meetings scheduled for Sunday morning.

"The Program Chairmen of the respective groups will cooperate in

Association	Monday		Tuesday		Wednesday		Thursday			Friday		Saturday			Sun.
	AM	PM	AM	PM	AM	PM	AM	PM	EVE	AM	PM	AM	PM	EVE	AM
Governmental Industrial Hygienists	□	□	■	■	▬	▬	▬	▬	▮	▬	▬				
American Industrial Hygiene Assoc.			▬	▬	■	▮	■	■	▮	▬	▬				
Industrial Physicians and Surgeons					■	▮	■	■	▮	■	▮	▬	▬	▬	
Industrial Nurses									▮	□	▮	■	■	■	□
Industrial Dentists	The American Association of Industrial Dentists will meet during the week; Schedule to be announced.														

Scheduled Meetings ■ Executive, Business, Informal, or Member Sessions □

Continuation in Attendance or Program Participation ▬

Bachrach photo
Manfred Bowditch

L. W. Foker, M.D.

J. J. Bloomfield

Robert A. Kehoe, M.D.

arranging the programs so that the subjects will be of timely and widespread importance, so that there will be no undue conflict, and so that the joint programs will be of mutual interest.

"Scientific exhibits will be separate from the commercial exhibits. The Scientific Exhibit and the Knudsen Awards will be presented at the dinner meeting on Thursday evening. A speaker of national prominence will be obtained for this meeting, and it is expected that there will be the usual good attendance of hygienists, physicians, nurses and industrialists at not only this dinner meeting, but likewise at all of the sessions."

THE following concerns some of the enlarged activities upon which the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS hopes to embark. It is true that some of these activities have not as yet been engaged in, but they are significant, even though only beginning steps have been taken to lay the ground work for the certification and training of physicians especially suited for this work, for undergraduate courses in industrial medicine, hygiene and surgery, and for postgraduate training courses. The purpose of this is to improve the training and qualifications of physicians who are in or are about to enter industry, and to publicize industrial medicine and surgery as a very worthwhile and attractive specialty for physicians finishing their medical and hospital courses. This will result in better treatment, improved health, less absenteeism, diminished accident frequency among industrial employees, to mention only a few of the benefits—all of which will react favorably on the balance sheets of the companies.

Included also in the plans of the Association are prospective surveys of industrial medical departments, with possibly a grading of the same and recommendations as to what improvements should be effected in individual instances; the furnishing of experts to be sent to plants to help solve problems relative to industrial health and hygiene, medical administration, etc.; the furnishing of speakers to attend meetings held by manufacturers' associations; and a central clearing house at the Association's headquarters for information found in the literature relative to any problem that may arise.

The war impetus has focused the attention of the country on the importance and prime necessity of industrial health, and it is probable that the momentum established will carry on so that either the government, the community or labor will demand it. If the employers take forward steps, these other agencies will have little cause to propose action in ways which both the manufacturers and the physicians in industry might find to be equally odious and unproductive.

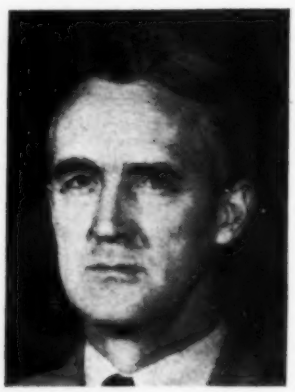
There also is a great need in a field which has been insufficiently explored, namely, the broad relationship between the medical department and the plant and the other departments. It has been truly said that the plant physician needs training in factory administration, and the factory administrator needs training in medical administration. These two groups should be brought together so that the possibilities of the medical department could be explored and utilized to the fullest extent. Far too often, the medical department confines itself largely to therapeutic measures, whereas its connection with safety, plant hygiene, and its inter-relationship with other administrative departments is almost entirely overlooked.

Much of this may appear visionary, but there are ample statistics to prove that each one of the abovementioned parts of the Association's prospective programs has already paid and will continue to pay big dividends to every corporation which takes part in putting them into effect. The Association

E. C. Barnes

J. B. Littlefield

H. H. Schrenk



Philip Drinker

Catherine R. Dempsey, R.N.

Elizabeth Sennewald, R.N.

Margaret W. Lucal, R.N.

Frances M. Yodis, R.N.

consists exclusively of physicians in industry and, being so close to industry, should put these plans into concrete action. Otherwise these developments will be very slow in growth.

The mechanics of all this will involve the means to employ a group of skilled field workers; to enlarge the office personnel so that every medical school would be contacted to expedite the establishment of courses in industrial health and hygiene; to give three-year fellowships to worthy applicants for special study in this field after they have graduated; to intensify post-graduate courses; to certify specialists in this field in the same way that they are now certified in almost all other specialties in medicine and surgery (such certification to signify satisfactory and intensive training in the specialty); to maintain a corps of trained visitors to visit medical departments to consult with them so that an annual list of medical departments in industry could be published with grading of the same; and to make specialists available to give consultation services to plants and to speak at their meetings whenever called upon. In many respects, this would be pioneer work and might, indeed, be the beginning of a new era in industrial medicine. But here, as ever, "Not failure, but low aim, is crime."

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The Civilian Neurotic

Dr. C. Charles Burlingame, of Hartford, Connecticut, started specializing in psychiatry in 1908, and has since become distinguished in that field.* He is also one of the pioneers in industrial medicine; he was identified with Cheney Bros., at Manchester, as early as 1915, and has long been an Honorary Member of the New England Conference of Industrial Physicians. He can, therefore, speak with authority on matters of industrial psychiatry, and what he says in that relation is worth thinking about. A comment of his concerning rehabilitation appears on page 52. More significant, however, is his recent address at a post-graduate assembly sponsored by the Institute of Medicine of Chicago, in which he pointed out that the problem of civilian neurotics, rather than the reconversion of returning members of the armed forces, is the major problem arising from the war. The civilian neurotic, he said, "is a person who, through personality traits and because of his emotional endowment or lack of it, has difficulty in meeting social, domestic, employment or other relationships to a materially handicapping degree." A tour of plants throughout the country had convinced him that the war's disruption of family, community, work, and other long familiar environments presents a problem much more important than readjusting servicemen to civilian life, of which so much has been said and written lately. "This war has released potential instabilities in people through the breaking up of patterns," and the problem for the psychiatrist is to develop new group psychotherapy and social techniques, especially through industrial management and labor organizations. Otherwise, he warned, the mass of people "who are about to be confirmed in their neurotic patterns" may drift on to "mass misfortune." The too free use of the term "neurotic" in the Army, and the fact that too many of the physicians in uniform are not as good as the best, are causing numerous returning soldiers to be carrying the neurotic label back into the environments in which they were perfectly normal prewar. This might seem unfair, in that many who are more marked by the tag than the reason for it find that those in the midst of whom they resume their interrupted lives may, and do, have the neuroses unlabeled. And possibly it *is* unfair. In any event, the neurotic phase of the whole problem of veteran rehabilitation has been, as Dr. Burlingame indicates, too heavily emphasized. The industrial physician, however, may find that this emphasis, and its individual identifications, have certain advantages. He has to contend almost daily with employee neurotic manifestations which, for obvious reasons, he does not designate as such, but as to which he has to proceed so carefully that, if the neurotic pattern is not confirmed, it is certainly not obliterated. But the readjustment in industry of the returning soldier bearing the neurotic tag becomes a definite and above-board procedure, with the patient cooperating. To the extent that it is a matter thoroughly understood by both physician and patient, the neurosis can be overcome. With the civilian neurotic in industry, however, the neurosis and its treatment are too often little more than a couple of one-way streets running parallel.

*See the current "Who's Who in America."

"Gangway for an American!"

Warner & Swasey, turret lathe manufacturers, of Cleveland, Ohio, have an advertisement on the inside front cover of *Business Week*, for October 28, 1944, which contains the following:

In uniform he made the "master race" fear him. In factory overalls he told the racketeer leader where to go, and produced twice as much as ever before. In white collar he planned and managed the production without which we would have lost the war. In other words, the true American.

Are you going to keep such a man quiet with a dole instead of an opportunity—with regulations instead of liberty—with coercion instead of cooperation? Pity anyone who thinks so!

Here comes an American—millions of them. And when they burst on a peacetime nation, there will be such a release of pent-up American energy as this world never saw. They'll want and will demand opportunity that lets the hard worker reach the level of the highest. Regimentation? Out of the way! Defeatism? Who said so? Coercion? Better not try it!

This is the land of opportunity, and these are the men who have earned it. Gangway for an American!

"Papa Knows Best"

The prohibition amendment, of unsavory constitutional memory, was "put over" by a bigoted, but earnest, minority. When it became the law of the land there was much smug preening among the self-righteous, much satisfaction in the forcible imposition of "Papa knows best" upon the then too inarticulate public. This continued in spite of the subsequent demonstration that prohibition didn't prohibit, and that the majority of the people didn't want it. And it still persists, for, from current indications, "Papa" is

NASAL DECONGESTANT

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Widely used for intranasal treatment of sinusitis, rhinitis, pharyngitis and laryngitis. Sulmefrin is mildly alkaline (pH about 9.0) and exerts locally the anti-bacterial action of sodium sulfathiazole which has almost optimum activity at this pH level.

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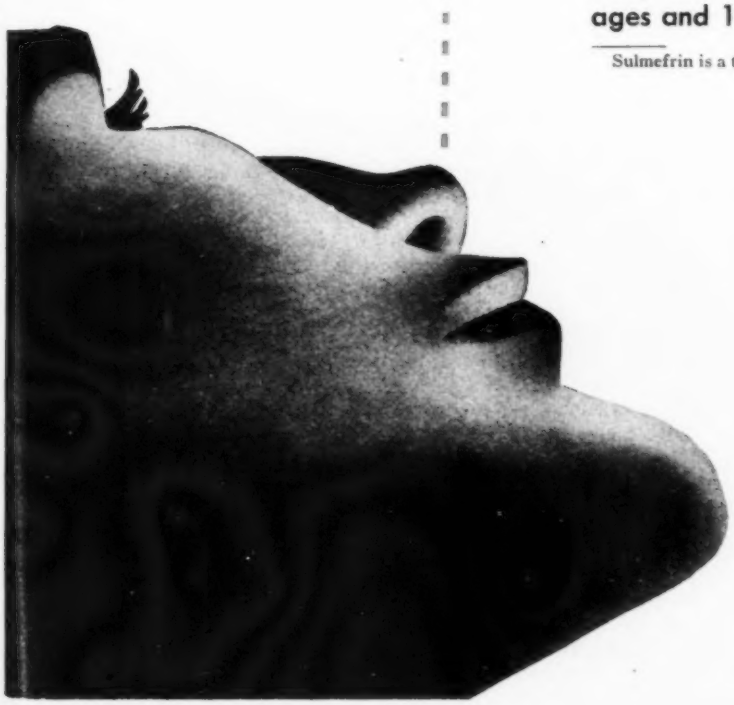

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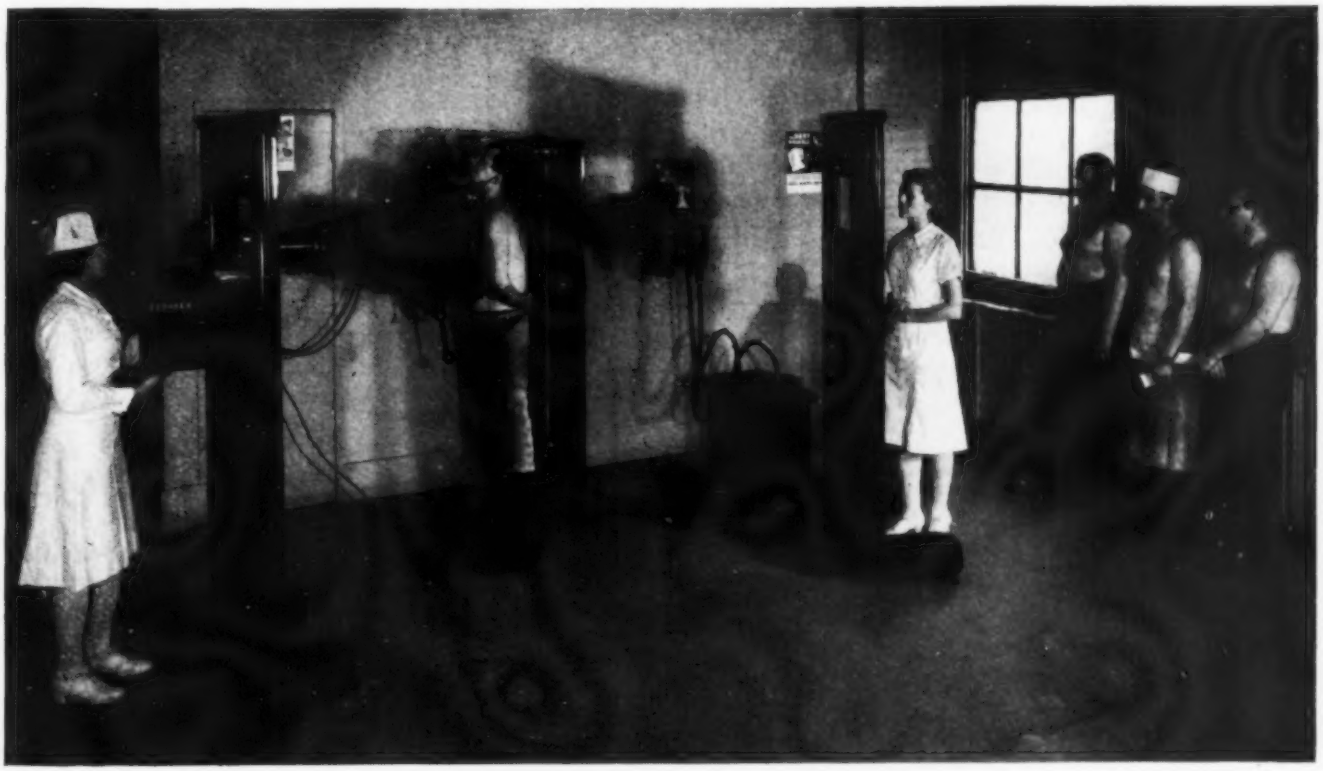
at it again—this time not only as regards prohibition, but in other respects as well. One of the other respects has the high-sounding shibboleth of "medical care," and the apparent object of making such care widely, and—through wage deductions—freely, available to all who may want it. The present interest, however, is not so much in the name or purpose of this movement as it is in who is "Papa?" and how is he going about it? There are answers to both of these questions in the editorial entitled "Principles of a Nation-Wide Health Program," in *The Journal of the American Medical Association* for November 4, 1944 (126:10, 640-642). We urge every member of the medical profession to read this editorial, carefully and thoughtfully. If you have read it, read it again. A majority of physicians and surgeons are old enough to remember the rise and fall of the prohibition amendment. They will recognize very quickly the startling parallel of individual characteristics and questionable methods as between the adoption of the prohibition plan 25 years ago and the too imminent adoption of this "medical care" plan today. As features of the parallel, a very large proportion of physicians and surgeons are in the service of their country now, as so large a number of those who didn't want prohibition were then; and the *coup-d'etat* of a rigged-up endorsement by one association or another is flaunted now, just as the resolutions of this or that religious or civic group were displayed then. The minority has once more been left in charge of the meeting, as it were, and it is taking advantage of the opportunity to become rampant and articulate. The parallel is interesting; it suggests that while "Papa" may be familiar with history, he hasn't learned much from it. But maybe he has—for this time there's a stinger in his plans. It lies in the difference between the *statute law* of the last war and the *administrative* law of this one. It is embodied in the following: "There are numerous, important regulations which cannot be specified in a law. Some of these regulations may be national in application. Others will be designed for certain localities or will relate only to particular forms of service. These regulations must be worked out by the administrative authorities and *when adopted have the force of law.*" The editorial goes on to say: "This paragraph represents the apotheosis of bureaucracy. Were the medical profession to agree to such a concept, it would be signing a blank check and turning it over to the non-medical administrators for such disposition as they might care to make of the future of medicine." This compels another look at the (collective) "Papa" in this matter, for it is perfectly plain that if he ever gets the control of the medical profession into his hands, he intends to "go to town" with it.

DR. PILGRIM

IT HAVING befallen me so many times to observe coincidences of expression, I have come to arrange them into certain patterns which might be termed the phenomena of great thoughts. A really good idea springs up here, and soon it is heard from as having erupted there, and then, while still the wonder holds, it has broken forth in a third place, unrelated. This might be a paraphrase of the ancient saw that "great minds run in the same channels," though more to my liking would be the connotation that good minds instinctively attack a problem with an inherent appreciation of the direction of its solving. So it has been with the problem of job placement, concerning which fine work is being done, no little part of the same being the forms and methods evolved for job analysis whereby the relations of capacities to requirements converge to where "X" marks their meeting point. WITTMER and JENKINS in the East, and KUH and HANMAN, DICK, and POOLE in the West are among the good minds all who have reduced the matter to satisfactory workability. Now comes another, with the ultimate logic of placement, looking ahead to the time when all the obvious "X's," properly set on forms, will leave a residue of need for refinement, wherefor DR. LILLIAN GILBRETH proposes the specialist in bio-mechanics, attached to and part of the medical department, to work with the physician in the closer adaptation whereby the specialist in medicine concentrates on the fine points of getting the man readier to be useful within the compass of his "X," and the specialist in bio-mechanics concentrates on refining and simplifying the time and motion elements of the job to the end of making it simpler and easier to fit into. As to which it was given me to be DR. GILBRETH'S sounding board in the broaching of her thought, from whence it returned to her with urge to carry forward, in the knowledge that although she may be somewhat advanced in her idea, these quickly moving times are such that they will soon catch up. . . . ANOTHER month of meetings and conferences, ripe with interest, and pleasurable in contacts with friends: The American Public Health Conferences in New York, well attended and teeming with live topics; luncheon at the Harvard Club with BOWDITCH, GRAY and TOWNSEND, later joined by LEGGO and HEACOCK; again at the Harvard Club, presiding at the annual meeting of the Harvard Public Health Alumni Association, where were GENERAL SIMMONS, PROFESSORS WILSON, FAIR, HUBER, and many others. . . . THE industrially slanted program of the American Academy of Ophthalmology and Otolaryngology where were blind, but spirited, HAZEL HURST and her associate, GEORGE COLOURIS, and where Bonnie, MISS HURST'S "seeing eye" dog did much resent the courteous assistance of DR. WIENER who introduced her to the audience. . . . THE dinner meeting of the New England Nurses Association, in Boston, where DR. JAMES P. DEERY gracefully presided, and where, waiting to address the nurses, was seated beside GOVERNOR SALTONSTALL, of Massachusetts, whose interest in industrial health is keen and intelligent. . . . THEN in Detroit, where were conferences with SELBY and MCCORD. . . . AND meeting with FRICK and CARRELL, officers of the American Association of Industrial Dentists, at a luncheon discussion of fundamental principles and unlimited opportunities. . . . AND conferences on medical administration problems, aimed at inaugurating preventive measures in a plant where the curative necessities have shown there is much to prevent, and where found unexpected interest and cooperation among physicians of the community. . . . AND more conferences, among them one to evaluate dust exposures in a war plant preparing to install an aluminum program as preventive means regarding silicosis. . . . AND then still more, with difficulty among dust-exposed employees in steel manufacture to convince them of the need for periodic examinations. Wherefrom sprang talk of proposed health clauses in union contracts, such as set forth in MALLETTE'S recent article — (INDUSTRIAL MEDICINE, October, 1944), with mention of the certain paragraph (b, page 776) whereby it would be the duty of the union's Health and Safety Committee "to make weekly inspections of the plant, including the first aid and medical departments," and regarding which one medical director said that, turn about being fair play, he would inspect them whenever they inspected him, but that he thought once a week would be a little often for physical examinations; another commenting that the interest and zeal in such union intendments were commendable and needed only direction. . . . AND participation in the earnest and constructive meetings of the Committees who are developing the program for the 1945 "Third War Conference" of industrial physicians, nurses, hygienists and dentists. . . .

The X-Ray Chest Survey is a Major Contribution Toward Employee Welfare



For obvious reasons, no industry will knowingly hire a man or woman with a tubercular infection; nevertheless, recent x-ray chest surveys of several million *apparently healthy* industrial workers have uncovered from 10 to 13 cases per 1000 employees.

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*The Relative In Vitro Activity of Certain Antiseptics in Aqueous Solution—Robert N. Nye, Boston, Journal of A.M.A., Jan. 23, 1937, Vol. 108, pp. 280-7.

Proposed Industrial Health Foundation

—A Preventive Medicine Institute—

FORREST E. RIEKE, M.D.,
Medical Director,
Oregon Shipbuilding Corporation &
Kaiser Company, Inc.,
Portland, Oregon

THERE is reason to believe that the Portland industrial scene will change considerably with the cessation of hostilities. A community which has employed 120,000 persons in six major shipyards in new vessel construction must expect a drastic reduction in such payrolls with a shift from a few large employee groups to several thousand smaller groups. As a physician engaged in the care of the health of many thousands of workers I have seen the development of certain highly beneficial medical services in these several large wartime industrial units. I am much concerned over the continuation and expansion of services which we have been able to offer local workers throughout in-plant operations. As large numbers of shipyard workers gradually return to small shops and enterprises they may well lose the health services which they have enjoyed while in war-industry plants. In the hope that this may be avoided the following proposal is offered as a means of continuing and enlarging the preventive medical work now performed at the shipyards.

The greatest benefit to workers in wartime work has derived from the *easy accessibility* of medical care and advice at the in-plant first aid unit. This ready availability of help, during working hours, while pay continues, has led employees to seek care for very early illness and small injury with a resultant prevention of serious trouble and a maintenance of health and productive capacity. In-plant (in overalls) care is more immediate by far than any other type of medical care distribution and results in the highest possible rate of prevention. Serious illness is found at its beginning and sent out to competent physicians and hospitals. As employee groups subdivide in the immediate future the benefits of the first aid dispensary should continue at their disposal. From a theoretical and a practical standpoint first aid dispensaries, properly located in industrial zones, would seem to be a logical substitute for in-plant medical units where employee groups are scattered in small units.

Union leadership does not approve of the practice of employers in examining workmen as a preliminary to hiring even though the Oregon Occupational Disease law now makes this obligatory upon prospective employees if employers insuring under the Workmen's Compensation Act so desire. Union leadership does, however, recognize the value of medical and laboratory examinations as a preventive medical technique and has indicated enthusiasm for this service if it can be rendered by some agency or organization other than the employer.

To accomplish the wider distribution of first aid dispensary care, the examination of workmen, the improvement of working conditions and several other good ends, your participation is requested in the establishment of an Industrial Health Foundation at Portland, Oregon, to undertake these several broad endeavors:

1. First aid dispensary service of a high order;
2. Performance of pre-employment placement physical examinations with a placement service for those found to be incapacitated in any way, whether war veterans or civilians;

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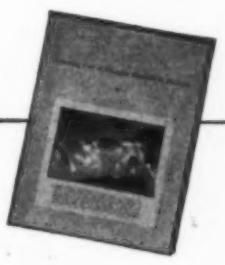

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Described in Jrl. of A.M.A., Jan. 9, 1943, vol. 121, pp. 123-125; Amer. Jrl. of Surgery, Sept. 1944, vol. LX5 No. 3, pp. 373-380; Archives of Ophthalmology, Mar. 1944, vol. 31, pp. 207-210.

The **BERMAN METAL LOCATOR**

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3. Medical examinations of those seeking union membership;
4. The performance of periodic physical examinations of workers in hazardous trades,
5. Occupational disease research and dissemination of discoveries to medical students, private practitioners, union membership, employers and public agencies.
6. Plant inspections and maintenance of hygienic working conditions, and
7. Legislative planning in industrial health matters.

Such a foundation should not practice medicine but should employ physicians to make examinations and assist in placement of workers with relation to their physical capacities. The organization should have its own building with x-ray and laboratory equipment and accommodations for examinations of large numbers of people. It would have great usefulness as a teaching institution and much of the examination work could be participated in by medical students. Such a foundation should serve as a clearing house for medical information which would be used for the benefit of the worker in such a way that it would be entirely free of employer abuse. Expense of such an operation should legitimately fall largely upon the employer who will gain very directly in improved production. Such an organization holds a special promise for small employers who cannot maintain a medical organization and who would otherwise have to operate through contract arrangements with some insurance firm or a physician group, which arrangements have obvious shortcomings.

It seems evident that good results in the industrial health field are of great importance, that the field involves many groups and agencies and that unless an organization is directed against these specific problems they will suffer in the future as in the past, from the common failing wherein "everyone's business is no one's." A Foundation so organized as to include representatives of labor, management and the medical profession will overcome various objections which obtain when any one of these groups dominates a health organization.

The next few months are especially propitious for the beginnings of such a Foundation. I am, therefore, placing this material before a number of interested individuals and groups. A much longer descriptive and explanatory outline of the proposed Foundation has been prepared and will be supplied upon request. Comment and suggestions are invited.

The Industrial Health Foundation

The Proposal

TO MEET a most pressing World need, Portland and many other American cities three years ago turned from thousands of pursuits to one main wartime effort, the production of merchant and combat ships. At the peak, 120,000 Portland and Vancouver men and women worked in six major shipyards three of which averaged an approximate 30,000 employees each. The community went through severe and unaccustomed trials of sudden industrialization, labor influx, price and wage upsets, housing shortages, transportation difficulties and excessive nervous fatigue. During a time when manpower was diligently sought for both the fighting forces and a single huge industrial productive effort, comforts and services were cut sharply. Problems of peace time which had been ameliorated by social agencies and service groups stood out sharply as these cushioning agents were stripped away. Every phase of human relations received the spotlight of public attention. Each 24 hours contained three working days; problems were compounded; the trials and confusions of 10 years were crowded into three. Everyone's living habits, thoughts and daily activities were affected; we were all jarred out of old routines and ideas and into

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new experiences and perspectives. Added to changes in life as we had lived it were new experiences directly associated with the development and maintenance of several tremendous industrial plants.

As the result of a stormy passage through these well remembered times and events I have felt that it might facilitate future operations for myself and others if various individuals would set down portions of their experiences, accomplishments, shortcomings and lessons learned. With this in mind I have attempted in the following pages to present the medical concept which has made the greatest impression on me in three years of shipyard work, namely, the *tremendously important contribution which preventive medical endeavor can make toward the maintenance of health and earning capacity of the working man and woman.*

Preventive Medicine

IN RECENT years physicians and public alike have displayed great interest in the economic and social problems of care of the sick and injured. Much study has been given to geographic and numerical distribution of doctors, nurses, hospitals and other medical services. The public is being persuaded to secure a measure of protection against large medical expenses by insuring with various medical and hospital insurance plans. Social security laws are being designed and expanded to care for those who break down and seemingly must go into discard. Physicians and government argue about socialized versus unsocialized medicine while agreeing that more people need more medical care. The public recognizes illness as a misfortune to be avoided even at considerable cost, knowing full well that the cost of avoidance is usually far less than the cost of convalescence and recovery. Against this background, discussion of the prevention of illness seems especially timely.

If all the excitement over the care of the sick were suddenly quieted and calm discussion substituted there would exist no dispute that every person should have at his command the *means for restoration of health.* Even then, however, and assuming that all wartime difficulties were cleared away and medical care were assured to all, it is predictable that physicians and public would still find something radically wrong with the health picture.

For splendid as care of the sick may be, it is, after all, the heartfelt desire of every sensible man to *remain well. What then of medical care for the man who is not yet ill?* When fortunes and monumental ingenuity are spent on "preventive medicine" for machinery and motor cars, what about the same kind of "preventive medicine" to maintain the *well man?* Will anyone dispute the tremendous economic saving of such a venture, the humanity and grandeur and intellectual challenge of a concept which plots the reduction of sickness and disability to the absolute irreducible? I think not.

What is Preventive Medicine

PREVENTIVE *medicine strives to maintain health and cut short the ravages of illness and personal injury.* It is an art and a science and has the attributes of a sociological house cleaning. It is all bound up in living habits, working conditions and wages, jobs, diet, proper clothing, education, rest and fatigue and all manner of things. It involves teaching the public how to stay out of health troubles and constant checking to assure that the public then remains free of illness or threats to health. Preventive medicine is primarily concerned with instruction of the public and the private doctor must be the teacher. In all frankness, physicians know now that much is required, but just what shall be taught and how must gradually be developed in progress up a long road to what is yet a dim and distant goal.

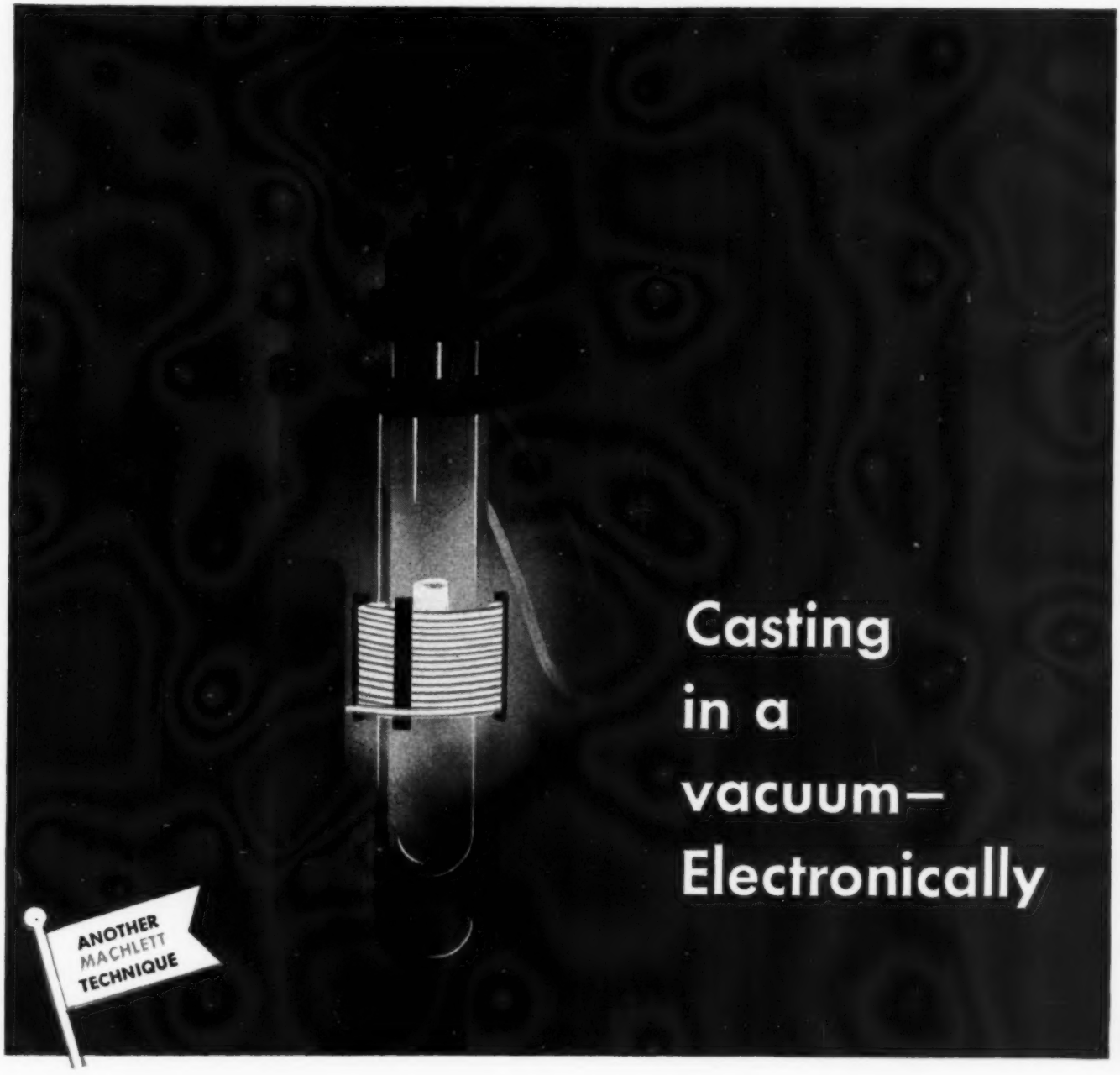
A hint of the "curriculum" may be revealed as this —to teach the public, from childhood forward:

When to seek medical attention—early.

The necessity for good medical care, from physicians.

How to select the right physician.

The true cost of medical care and the value of such care to community life.



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When the current is turned on, the metal melts and flows into the mould. Cooling is precisely controlled by adjusting the position of the heating coil, so that crystals form longitudinally, for maximum heat transfer under operating conditions.

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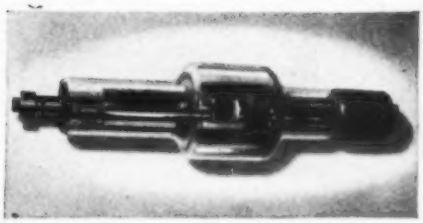

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If anyone has the temerity to tell me that these things are any more than just begun I will debate the issue with him anywhere, anytime.

Physicians have occasionally said that it was useless to provide good medical care because the public could not recognize good care and hence failed to use it when available. Such thinking is another instance wherein doctors fail to realize the absolute necessity for public instruction by the physician. The doctor is the only one who can possibly teach the layman how to appreciate, evaluate and seek good medical care. Professional reticence and failure to speak out in public on health problems represents mental sloth and poor leadership rather than a high degree of ethics as so often claimed. Failure to "sell the public" on the absolute necessity for medical care *by physicians* represents a major educational failure that will not be removed until every practicing physician goes on a militant crusade to educate and instruct the public on medical methods and services. Only then will better utilization of health facilities obtain and prevention of illness become a real force for good.

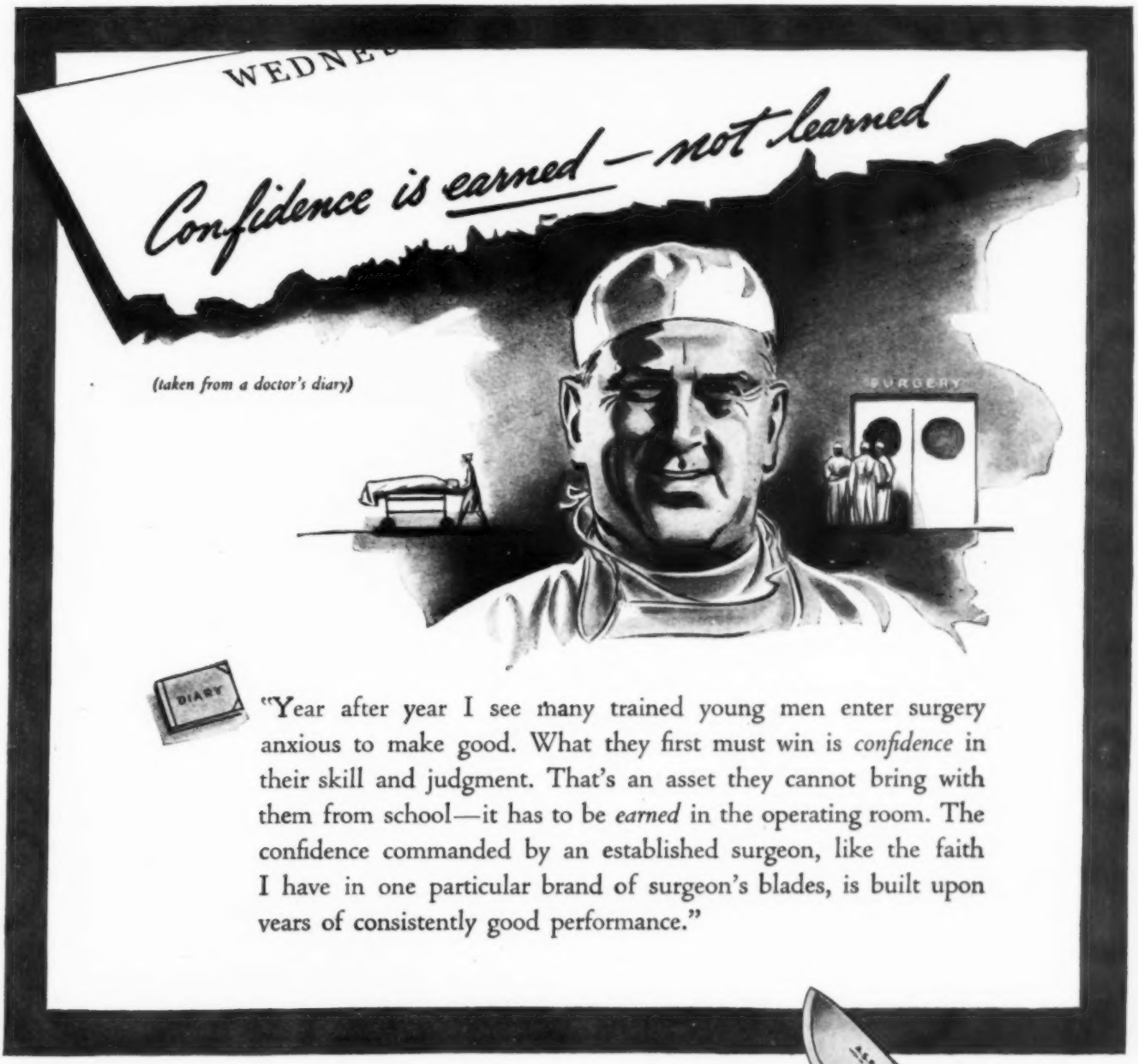
I might observe that most physicians who would qualify to teach such a "curriculum" need to re-think much of their medical knowledge and methods of care. It also seems evident that the physician who spends much time in such work, and the public will rightly demand such work, must look elsewhere for financial support than the fee-for-service income alone. I would further observe that this is not just another job to be eased off on public health officers. This is the job for the finest practicing physician, and if he fails to undertake it he fails his public duty.

For the time being preventive medicine finds its best application in large groups—in schools, the armed forces, large industrial plants, labor groups, etc. Many thousands of physicians in the armed forces and war-industries have developed skill in preventive techniques. They have seen that preventive medical work means less illness, less morbidity, less injury, more happiness and a healthier, better adapted soldier or civilian. They have seen a practice concerned with small medical problems, with the care of illnesses that *did not happen*. Those with clear insight have seen that there remains much serious illness but they have also seen that money and effort spent on prevention of morbidity has conserved health and benefited the employer and worker and through them the fighting man and the nation.

Preventive medicine is not new but, through the impetus of the war, it is enjoying a rebirth that holds tremendous promise for the reduction of illness and maladjustment in the entire civil population.

The war years have seen introduction into the plants of this community of many full-time physicians and scores of full-time nurses, and a fine start up the road toward good preventive medicine in industry. At a typical plant, Oregon Shipbuilding Corporation, the members of the medical staff render 30,000 treatments a month in the care of minor ailments and injuries. They consult with sick workers and refer several hundred a month to private physicians and hospitals. They give emergency care to seriously hurt and ill workers preparatory to hospitalization. They reduce the possibilities for late discovery of illness and complications of injuries and their efforts save many thousands of days of suffering and lost time. When requested by the worker the physicians do some examining of workers for transfer to other work but this work has been on a minor scale thus far. These are the preventive medical activities they *do* carry on.

They *do not do* pre-employment examinations. Doctors are not allowed to place a worker in work commensurate with physical capacities, the first day the workman comes to work. They do not take frequent chest x-rays which could help to stamp out tuberculosis, nor do they make periodic blood tests to discover syphilis. They do not *peri-*



"Year after year I see many trained young men enter surgery anxious to make good. What they first must win is *confidence* in their skill and judgment. That's an asset they cannot bring with them from school—it has to be *earned* in the operating room. The confidence commanded by an established surgeon, like the faith I have in one particular brand of surgeon's blades, is built upon years of consistently good performance."

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odically and routinely examine all workers to discover early disease of the heart, lungs, kidney, nervous system, eyes, etc. They do not periodically examine vision of crane operators and lungs of asbestos workers. In general, they are restrained from any full-scale preventive medical activity by the Labor-Management Shipbuilding Master Agreement which says, "There shall be no doctor's physical examination . . . except as required by law."

Although it is temporarily accepted as desirable and necessary that trained medical persons be employed for in-plant work in the protection of the health of war workers some doubt seems to exist about the continuance of such so-called "full-scale" medical work after the war. It should be made crystal clear at this point that no Portland plant now has anything approaching a "full-scale" medical program, that this is an unfortunate situation demanding improvement, that existing programs must be continued, that a widespread expansion of industrial medical work must be initiated, and that none of these things will happen without a great deal of conscious effort and pressure in the right places.

From the foregoing it ought to be quite evident that the medical work in industry is largely preventive and that improvement of industrial health care must necessarily lie in this realm.

There is reason to believe that the Portland industrial scene will change very considerably with the cessation of hostilities. A community which has employed 120,000 persons in six major shipyards in new vessel construction must expect a drastic reduction in such payrolls with a shift from a few large employee groups to several thousand smaller groups. As a physician engaged in the health care of many thousands of these workers I am much concerned over this important problem: *As large numbers of shipyard workers gradually return to small shops and enterprises, how are we to continue to make available those health services they presently receive and how can a much wider application of preventive health methods be arrived at for small employee groups.*

The following contains a partial answer which ought to produce far reaching benefits for employee groups.

The Industrial Health Foundation

PREVENTIVE MEDICINE FOR EMPLOYEE GROUPS: In the order of their importance, contributing factors to the maintenance of health in industry are these:

1. Readily available first aid dispensary service of a high order.
2. Doctor's physical examination and laboratory studies for purposes of job-placement, and periodic examination to be certain that occupational hazards and non-occupational illnesses are not injuring workers.
3. Occupational disease research by full or part-time physicians.
4. Pre-payment medical and hospital insurance plans.
5. Scientific analysis of shop environment for control of occupational hazards with consultative service to ensure removal of any objectionable features found.
6. Dissemination of information contributing to improved health in industry to employers, labor, physicians, and public agencies.

Such activities as these have been or should be developed over and above existing prewar medical and health services in Portland and Oregon. Their continued existence and growth can only be assured through strong support and formation of an organization whose main purpose is their perpetuation.

Portland has long been fortunate in the excellence of the medical care contributed by its private physicians, medical school, hospitals and public health officials. During the past many years these agencies have built up fine traditions of service, unsurpassed in the rest of the land. Many persons in this community have felt, however, that the care regularly offered through the years, which was largely *"corrective"* and directed toward the cure of fully developed and recognizable disease, should somehow be expanded and so far as possible actually transmuted to become *"preventive"* in nature. The highest ideal of the medical profession has long been to transform *"early diagnosis"* of illness to the *"prevention of illness,"* that is the complete "maintenance of health," a status obviously to the liking of every layman. Physicians and laity alike have gradually accepted and now are enthusiastically exploring new avenues and methods for the prevention of illness with the assurance that each step in this direction means more happiness and less economic distress to all the public.

In Portland, as in other cities and towns, the war has added tremendous impetus to preventive medical measures. The urgent need for the greatest possible speed in a war production race that had as its stake national life itself has made it crystal clear that the health of its workers is the nation's greatest productive asset, that the preservation of health is the concern of all and that individual beliefs, traditions and objection to change could not stand in the way of those things which prevent illness and physical breakdown. Growing out of this realization has come a willingness and urge toward experimentation and the development of *preventive medical* techniques to the highest level yet achieved by the race. These techniques are newest and have often seen their greatest growth when large industry has sprung up where nought but small plants existed before. Every change has not been for the best and a number of experiments have already gone into discard. No part of the country has a monopoly on the regeneration or transmutation of the *"preventive medical dream."* On the contrary, nearly every industrial physician, public health officer, personnel officer, welfare worker, some private physicians and most employers and labor leaders who have gone through the current wartime industrial cycle are full of the subject and zealous proponents of what they consider their own personal discovery—that the *prevention of illness* carries to the ultimate the physician's desire to provide the best possible care for the health of the public.

One important phase of health maintenance, the prepayment of medical expense, has seen its highest development in Portland and Vancouver. Prevention of delay in seeking medical care and advice has been powerfully implemented by pre-payment of medical and hospital expenses and physicians in this area have led the nation in developing plans which exploit this good end. The majority of our workers can now have the assurance that they may seek medical assistance when still well or but slightly ill, knowing that in large part their bills are already paid, no matter how serious the illness or injury. By removing the fear of a large bill these plans have been a strong preventive force aiding in early diagnosis and treatment before irreversible harm is worked and often resulting in complete prevention of illness.

Although frequently underrated, the greatest single implement of preventive medicine thus far developed in industry has been the *in-plant medical unit*, misnamed the first aid station. This crossroads of the industrial plant sees the closest possible approach of trained medical personnel to the every-day health problems of the layman and has produced a new brand of thinking about the importance of the *easy availability* to the layman of medical advice, skills and treatment.

I have discussed with a number of you the need for a combined health organization, jointly conducted by labor and management, financed by both and redounding to the benefit of union membership through improved health and ability to earn, and to the benefit of management through stability of workers less subject to recurring illness and disability and placed on work suited to their physical capabilities. Such an organization is easily available and a most practical thing at this particular time.

Apropos of this subject, a recent medical journal tells of a meeting held at San Francisco by representatives of labor, management, medicine, and government agencies in the interests of a wide extension of the benefits inherent in preventive medicine to members of organized labor groups. The journal emphasizes a lamentable gap existing between all groups involved in the discussions, particularly between labor and public health agencies on the one hand and organized medicine on the other. Differences in views on means to the end of improved worker health are even

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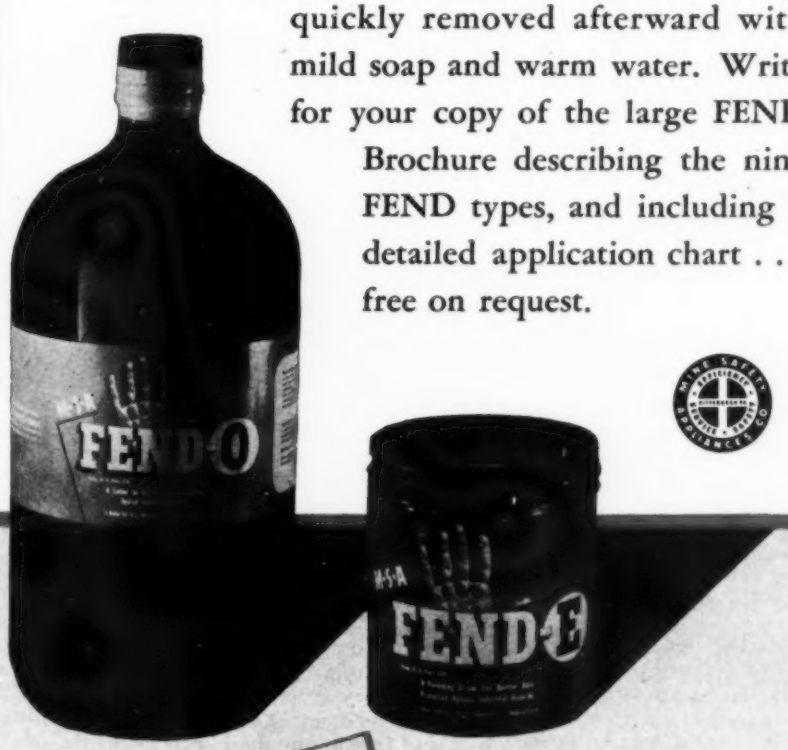

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inferred to be differences in final aims. Whether such differences are deeply graven remains to be seen, but their existence merits further discussion. In the past such differences have been very real in most large communities and must be recognized and drastically ameliorated, if not entirely removed, if the groups involved are to accomplish the application of medical and social gains to large employee groups.

Many economic barriers to early and good medical care are being removed by pre-payment payroll-deduction medical and hospital plans. Locally, operators of such plans have not thus far found it readily possible to divert limited personnel and funds to full scale preventive medical work. For various reasons it has been necessary to place emphasis on the correction of those ills which force the public to the physician's office—usually as a late event. Nor do they concern themselves directly with working environment, research in occupational disease and widespread use of periodic physical examinations, laboratory aids and techniques which educate the public in early discovery of disease. It is debatable whether such activities lie more in the sphere of medical and hospital plans or in industrial relationships and maintenance of productivity. At any rate, management, unions, public health officials and medical societies have all felt the need for such efforts but so far the groups involved have not been willing to "put the pistol down" long enough to make a good start in the field of preventive medicine.

There is general agreement that employee health—both physical and mental—is the one greatest productive asset vouchsafed the community and that when health is lost earning capacity stops, production is seriously hampered and the community suffers as purchasing power is lost and the worker becomes a public charge. *Health is a precious public asset* and its maintenance of widespread concern. It is my firm belief that there are very great possibilities as yet unplumbed in the fields of health maintenance and that our present wartime experiences are pointing clearly to direct and simple methods which can be exercised in achieving good for large numbers. Because these methods lie within the realm of labor management relations their widespread use will depend on the degree of acceptance and participation afforded them by these two groups. In this light, read the following discourse and give it your serious thought. The subject is one of current importance and certainly will command growing attention in the near future.

For many years employers have examined or caused to be examined by physicians, as a preliminary to the hiring process, those who sought employment. Some did so with a genuine concern for the health of the employee but many, probably most, with the intent of picking out the able-bodied, under the assumption that these would produce more per dollar of wage paid and with the assurance of reduced insurance costs because of fewer industrial accidents due to human failures. Such a policy took little recognition of the older workman's plight, he who had lost some of his capacity for hard work through long years of heavy effort. In many instances, as with a number of iron workers, miners, foundrymen and others in occupations with a measurable threat to health, employers have refused employment to older men bearing the scars of their trade, and callously discarded them as no longer employable in the only trade they know. Certain unscrupulous or ill advised employers have gone so far as to use younger men in extremely toxic or poisonous processes and, instead of removing the dangerous job, they kept a steady stream of men going through the job using the physical examination as a bellwether of unbearable over-exposure. Such abuse is fortunately rare in these more enlightened days.

Some employers have barred what they consider troublesome labor organizers from their job through use of doctor's physical examination. Such inexcusable abuse of the finest known method of health protection for the working man has received wide disapproval, and the physician who might stoop to such connivance would face ostracism as a professional man.

It is debatable how general these practices have been but they have naturally resulted in a refusal by certain unions to allow their membership to be examined by a physician as a preliminary to hiring. In some trade processes this has frequently resulted in direct injury to the worker who, because of gradually developing disability, should have been removed from the hazards of his trade. Such removal must be done for the foundryman with silicosis whose injury might remain stationary if he were employed at other than dusty work but who would most certainly receive further injury if longer exposed to hazardous dusts. So also the high rigger or brick mason or electrician or painter or carpenter or boilermaker or steel worker ought to avoid high staging and high climbing when his heart or balance is a little uncertain. Such men need to work at their trades but in places and in ways fitted to their physical limitations. The union is absolutely right in demanding that the man who carries the scars of his trade and who may be physically limited as a result thereof shall not be discarded but shall be helped to find a place of gainful employment at work within his limitations. So also with the man with a partial disability from other sources which only partially impairs his earning capacity. At the same time the union should insist that its membership receive those benefits which medical science makes available in the preservation of health and the prevention of disease. These benefits can only be made available to those who are unwell and those who are still well, through doctor's examination and analysis and the sincere cooperation of doctors, unions and employers in their behalf. Those who prevent doctor's examination remove most such benefits at the start. The latter statement seems quite clear, but a few further words of explanation may be worthwhile to avoid any possible confusion.

A tradesman does not undertake a "job" without first surveying the lay of the land. He then makes an estimate and with full knowledge of the circumstances proceeds to the work at hand. By the same token the physician can only do a "job" on the workman's health by looking at him and talking to him—in brief, by examining him. Once an estimate of the man's health is made, a number of possibilities for benefit develop. If the man has early illness it is discovered and easily cured. If physical disability is discovered his load can be lightened to prolong his physical vigor. If syphilis, tuberculosis, cancer, heart disease or other systemic illness is found, treatment can be started before irreparable harm is done. If vision is poor, glasses can be secured and avoidable accident prevented. If all members of a certain trade are found to be receiving low-grade poisoning from an occupational process, the process can be changed and health restored to all. If illness of an employee is resulting from a trade process, he can receive medical attention at the expense of the employer upon whose work and in whose employ he has been injured, etc. These things seem to be self-evident and preclude much disagreement.

Production represents the work of men, with or without machines, expended upon various objects. Without men—no production. Without health—no men. What benefits the health of the worker adds to his productive power and directly benefits the employer and the consuming public. Those employers who have had opportunity to compare cost of operation when employee health received no investiture of funds with similar jobs in which the reverse was the case do not debate the issue. They are well aware that money judiciously spent in maintenance of worker health is an even wiser expenditure than that so obviously necessary in machinery maintenance. They consider this expense a highly necessary and desirable cost of production and insist that their interest in the health of the worker is almost as genuine as that of the workman himself. This being so, it would appear that unions, management and physicians ought long since to have composed their differences, that the widest possible application of preventive medicine would be in effect to preserve the worker's health, and that a large proportion of the expense of such efforts would be borne by the employer. It is of great importance to see what has kept this from happening.

The main arguments between labor and management over health maintenance have centered about two main points, and when these are overcome much wider medical assistance will immediately be available to the working man;

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1. The industrial medical examiner has been directly retained and paid by the employer, or an employer-paid insurance firm, and has often leaned slightly or heavily toward the employer in disputes between worker and employer.

Where suspicion exists this can well be changed. The physician should not be placed in a position where he is suspected of trying to protect an employer's pocketbook while engaged in the protection of the employee's health and ability to earn. The physician engaged in "preventive medicine" should be free of undue influence and enabled to judge health considerations on their merits. This can best be done if the doctor is employed by a third party without *domination* from either labor or management, but with the active support and cooperation of both.

2. The worker who has received physical disability through advancing age, accident or occupational disease has not received proper consideration in the past, and this must be corrected for the benefit of all. Discard of a worker must not be permitted, and financial provision must be available if physical vigor diminishes or fails. This high aim is avowedly the purpose of an extending program of social security but is not immediately attainable. For the employee's sake it is desirable to help him to continue at work, if not at his regular trade then at lighter work. The worker will be better served and the expanding cost of social security partially reduced through intelligent utilization and preservation of manpower.

These aims will be materially advanced if workers are:

1. Placed on work within their strength,
2. Forewarned of preventable physical breakdown, and
3. Rehabilitated through corrective and preventive medicine.

A third problem has been the seemingly insurmountable difficulty for the small employer when he attempts to provide any adequate health protection plan or program for his workers.

THE speed and strain of war industry through which we are now passing have taught us much in a short time about these three difficulties. They demonstrate the need for much more medical attention for workers and working conditions, over and above anything provided, now or in the past. They teach us that workers need quick and good first aid for injuries, easily-accessible medical advice and attention, periodic physical and laboratory examinations, study of occupational disease, far better job hygiene and sanitation, and close medical control of hazardous working conditions.

To accomplish this in the community of Portland, Oregon, I believe there must be established a non-profit Foundation for these express purposes: The "Industrial Health Foundation—a Preventive Medical Institute."

ORGANIZATION. The Industrial Health Foundation should be incorporated under the laws of Oregon as a non-profit (charitable) corporation with a Board of Directors composed of the following: representatives of organized labor; representatives of employers; one public health official (medical); dean of medical school or his representative; representative of organized medicine appointed by president of Multnomah County Medical Society; executive director (physician).

Under the direction of this Board the executive director should administer the operation of four divisions: (1) medical division; (2) safety and technical division; (3) clerical division; (4) educational division.

It is believed that a *cooperative* effort, closely controlled and jointly financed by labor and management will resolve those problems pertinent to both, solutions for which are now possible given a proper executive organization.

SUCH a foundation should *not practice medicine* but should serve as a clearing house to bring together the best efforts of management, labor unions and physicians in the following preventive medical matters. Through doctor's physical examination, laboratory and x-ray examination, chemical laboratory analysis, job-analysis and job-transfer and job-placement rehabilitation among those going into apprentice training, those going into different employment, those regularly employed at any union trade or process, returning veterans, and so forth, the Foundation should unceasingly strive toward:

1. Prevention of economic loss and wasted training through early discovery of unsuspected illness.
2. Physical evaluation of workers and placement in types of work not contra-indicated by physical and emotional status.
3. Research in occupational disease and evaluation and removal of those harmful production processes revealed through medical analysis of workers.
4. Placement of workers in non-harmful employment who are developing signs of occupational injury and who might receive further injury if left on their current employment.
5. Proper placement of physically handicapped, both civilian and veteran.
6. Prevention of unnecessary illness and injury through instruction of employees in safe practices and personal protective methods.
7. Protection of employees' economic interests through early discovery of disability resulting from hazardous trades.
8. Improvement of job-hygiene and removal of industrial hazards through consultation by medical and technical staff with employers and unions.
9. Education of physicians, medical students, management, labor and interested public agencies in occupational disease matters.
10. Prevention of delay in seeking medical care by extension of pre-payment medical and hospital insurance plans.
11. Planning in the preparation of legislation for improvement of working conditions and employee health.

Preventive Medicine Instrumentalities

THE FIRST AID UNIT: It has been stated that the in-plant first aid unit is one of the finest preventive medical developments to reach widespread acceptance in the war years. The state industrial accident commission, private insurance carriers and the board of health have shown interest in the operation of such units but each has certain legal or financial limits which circumscribe its activities in such work. If preventive methods are to flourish, the first aid dispensary must have full recognition as a high-powered preventive medical instrument and a method must be found to perpetuate its usefulness so that its tremendous contribution to the reduction of morbidity and the prevention of serious illness will not be lost. *Such a unit does not practice medicine; it does* render thousands of treatments monthly which would not otherwise be given. It renders great service as an instrument of public instruction and it makes work for doctors. Its easy accessibility makes for quick and early treatment thus preventing the development of needless infection and serious illness. Its early attention to minor disturbances permits a screening activity by trained medical personnel and by referring scores of those with incipient serious illness to private physicians, and away from health cultists, it directly raises the level of medical care delivered to the public. It is accurate to state that the first aid dispensary does a tremendous volume of work that would not otherwise be done while at the same time increasing the total work done by private physicians. It serves as a screen and a feeder for those who deliver both *preventive* and *corrective* medicine.

SMALL-PLANT HEALTH PROBLEMS: Prewar industrial Portland, and postwar Portland without five major shipyards, is essentially a community of small employers; merchandisers, distributors and producers. Wartime Portland has developed a relative "feast" of medical care in the large plants where large medical units are easily possible, and a "famine" in many smaller plants where the only medical provision is a first aid box and a compensation carrier. This is simply an exaggeration of the normal peacetime picture and in the normal order of things reconversion would only result in dropping out the "feast" portion of existing services.

Those given to worrying about industrial health have always considered the problems of the small employer

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far more difficult of solution than those of large industrial units. Some health officials have urged the producer with a few employees to retain a nearby practicing physician on a part-time basis. The doctor would presumably interest himself in the particular problems of the producer and his employees and develop skill in solving these problems. Close scrutiny reveals a number of flaws in this proposal. A few such plant-physician relationships have been worked out in this community but medical societies have not infrequently blocked moves of the sort by tarring the physician as a "contract physician." Busy general practitioners have had neither time nor inclination to go into the plant on an observation and consultative basis. Physicians have not previously been trained to think of themselves as industrial health officers nor have they been schooled in industrial hygiene and medical techniques. Unfortunately physicians infrequently locate in the immediate neighborhood of purely industrial zones. Moreover, employers have not felt inclined to spend money in this direction, nor to invite the physician in as a consultant or adviser on operation.

A logical solution to this whole problem lies in the direction of a non-profit Foundation. It can, if advisable, operate first aid dispensaries in industrial zones in the immediate neighborhood of several smaller establishments. It can also make available on a fee-per-employee basis all of the medical and technical services presently available to the large employer. Small employers in hazardous trades can afford to pay for pre-employment and periodic check-ups of employees and with the aid of a watchful Foundation maintain a safe operation with resultant marked savings in insurance premiums.

FOUNDATION BUILDINGS: The Foundation will require a building in a central location preferably near the central labor temple and large enough to provide space for:

1. A large collection of medical records and x-ray films.
2. Waiting rooms and reception clerks.
3. Doctor's offices for interviews and examination.
4. A clinical laboratory for studies on blood, urine, etc.
5. A full chest x-ray equipment with dark room, etc.
6. Dressing room quarters for a permanent staff of clerical workers and nurses and a visiting medical staff.
7. Conference room for use of physicians, union officials, management representatives, etc.
8. A library of industrial medical books and journals for use of medical and technical staff.
9. Offices of the directing personnel such as the executive director.
10. Duplicator room for preparation of pamphlets, reports and other educational material directed to the unions, management and public agencies.
11. Quarters for working equipment and supplies.
12. In the same building or a separate building a chemical, analytical laboratory for study of plant hygiene conditions.
13. Office space for chemists and safety consultant force.

If and when the Foundation becomes active in first aid, small dispensary buildings in industrial zones will be needed.

RELATION WITH STATE ACCIDENT COMMISSION: The Occupational Disease Law (Oregon Laws of 1943, Ch. 442) which became effective as a part of Workmen's Compensation legislation on July 1, 1943, says in effect that the employer who insures his workers under the state act may request pre-employment examination of all applicants in which case the accident commission must designate a physician who will examine the applicant. The law specifies that the commission shall choose the doctor and that the employer shall pay the doctor. If the employee is then hired, the employer has 10 days in which to file a copy of the doctor's report with the accident commission. This implies that the doctor's findings shall become the property of the employer, a situation contrary to the necessary confidential relationship of physician and patient, and objectionable to both physician and examinee. This arrangement is awkward at best and, although it broadly outlines method for examination, it leaves much unsettled that will influence the degree of cooperation and acceptance of its principles by both labor and management. Furthermore, if such examinations are to reach their greatest usefulness, their findings should be utilized by physicians who are trained in job-placement with respect to physical abilities and capacities. The best way of achieving this is through the Foundation where doctors will rapidly develop skill in such work. A nucleus of trained industrial physicians have already acquired such skills in wartime industrial work and could give the Foundation's efforts in this field an authentic start. Costs of such examinations should be borne by the employer.

The accident commission is of course concerned that such examinations be fully utilized for good ends and the unions will be insistent that they not be used simply as a criterion for excluding certain subsequent claims under the occupational disease law.

RELATIONSHIP TO PRACTICING PHYSICIANS: The Foundation can serve best as a clearing house to bring together medical findings, job-findings, and the employer, employee and union official who are concerned with harmonizing these findings in the best interests of the worker's health and productive capacity.

It is possible for such an agency to arrange for examinations by physicians, at their offices, through existing channels such as the Oregon Physicians' Service. In such case the doctor's report would require processing by the Foundation staff, an obvious duplication and a less desirable arrangement than a direct Foundation-doctor contact.

Physicians will acquire skill in this type of work if they work at the Foundation on a part-time basis. The educational possibilities on industrial problems of such an arrangement are boundless for physicians. The first big step in improved industrial health in this community must be the broadening of doctors' participation in the industrial scene and this requires a rapid instruction in the methods of such work as well as wider knowledge of the work processes of the employees examined and placed. Such knowledge does not accrue to physicians through dilatory pursuit of the facts involved. The Foundation will serve as a focal point for intensive post-graduate study by the physicians who choose to participate in its medical work. They should be remunerated on a definite per-hour basis and a portion of their time should be spent each week in inspection of plant facilities and study of job requirements.

FOUNDATION MEDICAL STAFF: The Foundation will secure the services of the best obtainable physicians. The extreme importance of their work to factors influencing the livelihood of employees makes it imperative that these be good physicians of unquestioned integrity and good will. The staff will be hunting for evidences of illness which are assumed to be slight and greater diagnostic skill is required to find *very early* signs of disease or injury than might be required to define a serious and clearly recognizable sickness. The doctors must therefore be skillful and will command a salary in proportion to community levels at the time of employment. Although the staff will limit its Foundation activities to diagnosis, the training required for this work is arduous and those who work in such endeavor practice a specialty calling for discernment and rare judgment and should be paid accordingly.

Doctors who may be presumed to have had a good background for this work are those from war industries, veteran's rehabilitation facilities, state industrial consultative services and practices largely constituted from employee groups. Those with a diagnostic bent and enthusiasm for social problems and the ways a man may earn a living will develop through Foundation experience to a very useful position.

FOUNDATION RESEARCH: The Foundation staff will engage in research in whatever industrial health or preventive medical problems lend themselves to study by this group. Their findings shall be made available to unions, manage-

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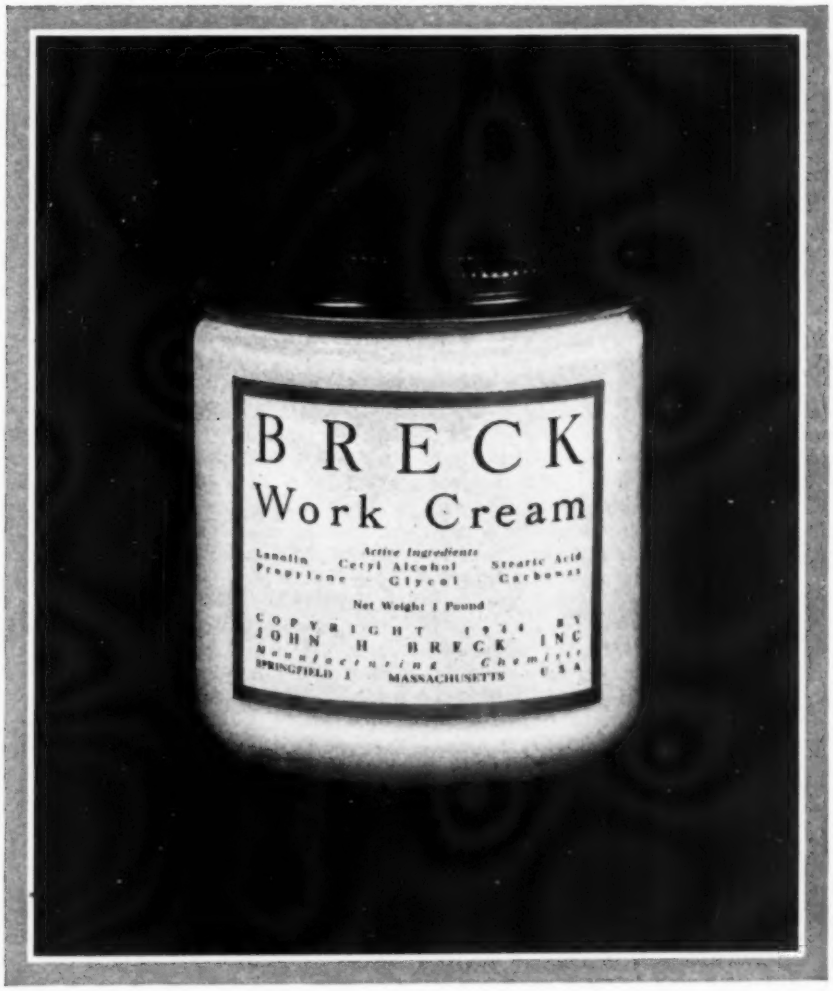

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ment and public agencies but in all cases shall be used to forward the welfare of the working public.

RELATIONSHIP WITH PUBLIC HEALTH AGENCIES: As presently constituted the state Board of Health has an industrial hygiene consultative staff active in the community. Its continued existence is clouded a little by uncertainty regarding continuing Federal or state financial support, but its work is highly commendable and it is anticipated that the Foundation safety and industrial hygiene staff would work as a complement to this state agency in fields beyond their reach. The field is large and will not be well covered until a number of agencies are at work in its several aspects.

The Foundation would cooperate to the fullest extent with public health agencies in the control of venereal disease, tuberculosis, etc. Blood samples would be sent to the Board of Health laboratory for syphilis testing, and those determined to have the disease would be referred to public health clinics or private physicians for care. The chest x-ray facilities at the Foundation would help control occupational diseases of the lungs and form an additional point of contact in the effort being made by the state Board of Health in its effort to stamp out tuberculosis through yearly chest x-rays of the public.

The Foundation will be active in matters of employment, unemployment insurance and disability and will have extensive dealings with those agencies concerned with such fields.

RELATIONSHIP TO VETERANS: The Foundation should prove an admirable medium of assistance in placement of medically discharged veterans of this war. The veteran is not receiving the advantage of medical examination except in the largest plants, and it is extremely important that this service be extended on a community-wide basis. This seems a natural function of such an organization and one which should be developed early in its existence.

RELATIONSHIP TO MEDICAL SCHOOL: Working conditions and health of employee groups will improve directly as an informed medical profession begins to participate in industrial matters in Portland and throughout the Pacific Northwest. Such a Foundation will prove a focus for instruction of medical students and their clinical instructors in industrial health problems and their solutions. Medical students should participate as fully as possible in the diagnostic activities of the Foundation with the anticipation that any lessons learned will be reflected in greatly improved relationships as these students become the practicing physicians of this area.

RELATIONSHIP TO EMPLOYEE, UNION AND EMPLOYER: No employee groups should be excluded from the benefits of the Foundation. Workers will be referred at their early convenience by their union for physical examination and laboratory studies as indicated. The examining physician will discuss the findings of the examination and suggest remedial steps which the worker ought to take to bring his health to the best attainable point. An occupational history will be taken and the physician will weigh this with other findings. He will also advise the worker of the date of his next examination. The Foundation will keep track of this date and contact the worker through his union and employer in advance of the date. Wherever possible, examinations will be performed on working time. Every worker will be examined yearly. Unless changes of employment are very rapid the worker will be examined between jobs, just after leaving the employer's service and as close to rehiring as possible. Those on jobs which are definitely dangerous to health will be examined at indicated intervals, in some instances once a month, in others each three to six months.

Most workers will be fairly normal, and no unusual efforts to place the worker in a new or different job will be necessary.

If the physician determines that any worker requires special consideration regarding his employment he will work with the union representative to accomplish any necessary change of classification, even of union if indicated. In conference with management the union representative will assist the worker to find his proper place and level of employment. It will prove sufficient if the union representative knows the job limitations of the member, the things which he should avoid and those which he can undertake. The cooperative employer will not abuse such information and will participate in proper placement and protective measures for the worker. The noncooperative employer will be barred from such helpful information.

In any case, the medical information derived in questioning and examinations will remain confidential between the physician and the workman and cannot be given to the union or the employer. The Foundation record will be available to the employee in the protection of his interests in differences between self and employer over working conditions and health but will in all other instances remain the confidential property of the Foundation. Legal safeguards will be erected to maintain this status for Foundation records.

Union representatives have asked why employers would pay to have examinations performed on prospective employees and "old" employees if the employer is not to receive a true copy of the medical report for his use. There are several reasons aside from the effect of such an effort on employee goodwill and morale.

The experienced employer knows that many prospective employees are in far from good physical condition when hired. He knows that it loses money to hire a worker and train him for a job only to find later that he is not physically or mentally qualified to handle the job. The cost to the employer is also large if skilled workers suffer physical breakdown and are lost to the job. Rehabilitation costs ensue, and the cost of training a suitable replacement is not easily overlooked. It is the part of wisdom for the employer to pay the actual cost of health maintenance in such instances. The employer saves much unnecessary expense if a competent Foundation staff and an alert union go to considerable pains to be certain that workers remain healthy and are sent to jobs within their physical capabilities. Accident insurance and production costs drop measurably under such a system. These are the advantages we propose to deliver to the employer. If he is honest in his intended use of the pre-employment and periodic check-up examination he will not care that he doesn't have a weapon to hold over the workman, but will rest assured that his men are not receiving avoidable injury and that physical breakdown will not occur if it can be forestalled by preventive medicine.

THAT all employers, or even a majority, will turn immediately to the Foundation and demand the privilege of paying for examinations on their employees is too much to hope for. It will not be long, however, before the financial and social benefits of such a practice will become apparent to employers and they will ask to be allowed to participate in this worthy enterprise.

After all, the primary benefit of health maintenance falls on the worker and it is in his interest that unions are asked to join in the establishment of this Foundation. Those employers who are willing to participate on a basis of sincere and open interest in the welfare of their employees should be allowed to join in the activities of the Foundation at an early date.

Those employers who will not subscribe to the high aims of such an endeavor warrant little sympathy by organized labor and can probably be shown the error of their ways in competition with better-run business enterprises.

Advantages to union membership of such a Foundation service have been fully enumerated previously. A further example lies in the selection of apprentices for training. Economic waste and unhappiness will be avoided if a prospective apprentice receives examination and physical factors are unearthed before training begins which might make it useless for the boy even to start into certain trade processes. The boy with uncorrectible eye difficulties may not be able to do close machinist work. Certain chest conditions may make inadvisable work in dusty atmospheres. Various general illnesses may dictate office work rather than jobs requiring heavy muscular effort, etc.

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It has been suggested that it is not the place of the union to insist that its members undergo periodic physical examinations. In my experience it has never been necessary to force workers to accept health services and advice when such services are well understood and rendered without strings attached. Workers voluntarily seek such services and are very pleased to receive them. In view of past union experience and policy, however, Foundation service would not be well accepted unless workers clearly understood that labor was a founder and co-sponsor of the Foundation and that unions heartily urged participation by members in all its activities.

Unless unions will make it general policy that members are to participate routinely in medical examination and services, many workers will fail to take advantage of the benefits offered, and both they and their fellows will suffer. With poor participation the individual loses the benefits of early *diagnosis and prevention*. If group representation is poor, occupational disease research is at best very sketchy, and it is difficult to find and remove industrial health hazards.

Union leaders question whether the union has any place in health maintenance. They feel that it may infringe upon individual rights if they attempt to advise the membership to secure certain health services as a part of union membership.

Individual choice and decision is an important American right. I repeat, however, that I have not seen a workman reject the benefits of a non-compulsory health activity when he clearly understands the nature of the service.

Unions were founded as a cooperative fellowship to improve economic status and working conditions through collective action. Unions have always been active in the removal of unhealthy and unsafe working conditions. Their members look to them to lead the way in those activities which will improve working conditions and earning power. After all, shorter working hours, vacations, better sanitation, bath houses, plant cleanliness, safety programs, etc., are all health measures of recognized worth and secured by union efforts. Previous union activities have over and over again served to prolong the working man's span of life and earning period through improved health and removal of hazards.

I would also remind that over 75% of industrial injury results from human physical failure. In the interests of safety alone, unions are obligated to protect each of the members from the limitations of others by constant vigilance to be certain that no one reaches such a state of physical disrepair as to endanger himself or others.

The trend is quite clear. Preventive medical work will be done in ever increasing volume. Doctor's physical examination will be widely used and many employers will demand its use on prospective employees. I offer this word of advice with the hope that union leadership will accept it in good faith—presence of the Industrial Health Foundation on the Portland industrial scene will block most of those abuses which might otherwise arise from preventive medical activities by employers. Moreover, it will largely remove from the field of conflict the whole subject of health maintenance and occupational disease with much resultant good for workers and their employers.

Financial Considerations

THE worker who is examined should not pay a direct fee-for-service unless he voluntarily seeks medical advice outside of regularly appointed visits.

Pre-employment examinations rendered under the Occupational Disease Law of 1943 should be at the employer's expense. So should periodic examinations of those working at extra-hazardous occupations where examination must be frequent in the interest of safety.

Annual examinations as a health maintenance measure should fall on the workman. If union fees or employer's advertising funds were to go for this purpose the Foundation would raise no objections and might even urge such a move.

Costs of erection of Foundation buildings should fall on both management and unions.

Operational costs of the Foundation should be paid by fees for examination, endowment and grants from employers, unions and government.

Research and educational costs can well be paid by employers, unions, the state accident fund, and special grants-in-aid.

IN THIS dissertation I have attempted to air a number of problems and to skirt many others. I well recognize that the field of health maintenance has been the scene of long and bitter arguments by labor and management. I would seriously plead with both groups that they attempt to stop fighting over health and both do their level best for the workman, realizing that all money and effort spent on such a worthy thing will result in great benefit to organized labor through better health and earning capacity and to employers through reduced labor cost, reduced turnover, reduced absenteeism, reduced insurance costs, an increased output with improved morale and labor relations.

To the medical profession I would like to observe that the need for trained, sympathetic physicians in the field of industrial health is a growing one that must be filled. The problems of industrial medical work demand a unique combination of the best aspects of the methods of private practice and public health and the results are most gratifying. I would urge whole-hearted participation by the medical profession in this phase of medical work with the same high ideals of service that motivate its efforts in other fields.

The presence of the Industrial Health Foundation in this community should be conducive to improved working conditions and better health for thousands of workers for many years to come. Active help and participation in its establishment is earnestly desired and will be very welcome.

Preliminary Report on Prophylactic Topical Use of Sodium Sulfacetimide (Sodium Sulamyd)

JOSEPH J. TOLAND, JR., M.D., F.A.C.S., F.I.C.S.,
Medical Director and Chief of the Surgical Department of the Nazareth Hospital, Chief of the Surgical Department of the Northeastern Hospital of Philadelphia,
and
IGHO H. KORNBLUEH, M.D.

THE reports on prophylactic, local treatment of wounds with sulfonamide compounds at Pearl Harbor by Moorhead,[1] Long and Ravdin,[2] and Cloward[3], and the publication by Burdenko[4] have greatly popularized this kind of therapy. Spink's[5] statement that "under certain conditions there are distinct advantages in applying the sulfonamides directly to tissues" must be fully endorsed.

There is no doubt that sulfonamide derivatives are very valuable for traumatic surgery, provided they are applied carefully and logically. An indiscriminate use with negligence of the general rules of wound treatment and asepsis does more harm than good, and the results are far from being satisfactory. It must be stressed time and again that sulfonamides are not substitutes for routine surgical procedures. There is certainly, also a big difference between therapeutic and prophylactic use, and between elective and traumatic surgery.

The first question: Should sulfonamides be used prophylactically in traumatic surgery? This question can be answered: Yes.

The second question: Do these compounds interfere with healing, and can an infection be prevented? The experiences of the last few years speak generally in favor of local application of those sulfonamides which exert a valuable effect against many of the common infecting organisms. With the use of certain sulfonamides, healing is not delayed.

The third question: Is the general condition of the patient endangered through such therapy? The use of small amounts of sulfa-compounds locally does not cause any toxic symptoms and, therefore, can be regarded as harmless.

Immediate and persistent antacid action

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The topical application of these compounds, according to Spink,[5] Robson and Tebrich,[6] Green and Parkin,[7] and other authors, provides, in a relatively short time, a very high local concentration in a small area. The curative value of local applications to already infected wounds is less well established.

Robson and Scott,[8] discussing the value of topical therapy, state that "while no general agreement has yet been reached, the consensus of opinion, based on clinical evidence, would seem to be that they are effective for some types of infections provided they are applied prophylactically or in the early stages of infection." "There is, however," according to the same authors, "little experimental evidence concerning the value of locally applied sulphonamides in the treatment of infected wounds."

Green and Parkin[7] are in favor of topical treatment in localized infections but admit that the opinions about the value of such treatment are quite at variance. Silver[9] points to the fact that the reaction of all tissues which may come in contact with locally used sulfonamides has, as yet, not been determined. Irving[10] mentions in his paper a publication which opposes generally the use of sulfonamides prophylactically in clean wounds. Large crystals or caking may cause a foreign body reaction and delay healing.

The great majority of authors are in favor of local use of sulfonamides. The extensive literature and the restricted space of this paper make it impossible to enumerate all the reports on successful treatments. Long[11] summarizes the general experiences with sulfonamides as follows: The prophylactic and therapeutic use of sulfonamides has revolutionized the whole field of surgical infections.

It is difficult to prove that infections were prevented in a certain number of cases treated with sulfa-compounds. Even the comparison of the duration of disability for both treated and untreated cases does not give a fair picture, and is subject to mistakes due to varieties of general surgical treatment and individual differences of the patient. The evaluation of a new drug is, therefore, always subject to certain difficulties and a small margin of error cannot be entirely eliminated. New compounds are synthesized even before all possibilities are exhausted and experiences with the older ones completely evaluated.

The efficiency of the local therapy with sulfonamides depends upon several factors:

1. General condition of the patient.
2. Kind of sulfonamide used.
3. High solubility in order to produce high local concentrations.
4. The solution should not appreciably deviate from neutrality.
5. Penetrability into the tissues.
6. Low irritability. 7. Effect on the phagocytic index.
8. Kind and extent of the injury.
9. The absence of inhibitory substances.
10. Kind and number of bacteria.
11. Time of first treatment.

INSPIRED by good reports from England by Fraser,[12] Robson and Scott[8], Robson and Tebrich,[6] one of the authors (Toland) decided to investigate the practicable value of sodium sulfacetimide. The uncertain results from a prophylactic treatment cannot be compared with the precision of a chemical test. Criticism and evaluation must be put, therefore, on a wide basis and not restricted to a limited number of successfully treated cases. In accordance with this rule, the experiences collected in treatment with sodium sulfacetimide on a large number of patients are here briefly presented.

Sodium sulfacetimide or sodium sulamyd is the sodium salt of P-aminobenzenesulfonylacetylimide. It is evident that the maximum of absorption and the minimum of irritation are achieved with solutions of a hydrogen ion concentration approaching neutrality. From four tested sulfonamides, the pH value of sodium sulfacetimide solution responds most nearly to this requirement. The average H-ion concentration of the human blood is approximately pH 7.25 (Van Slyke.[13] Dill[14] gives slightly higher figures, varying between pH 7.36 and 7.44.)

Aqueous solution of sodium sulfacetimide:

Solution	pH
5%	8.25
10%	8.48
20%	8.84
30%	9.09

Comparison of four sulfonamides in saturated aqueous solution:

	Concentration	pH
Sodium sulfacetimide	56.9%	9.24
Sodium sulfadiazine	51.7%	9.88
Sodium sulfathiazole	28.6%	10.42
Sodium sulfapyridine	50.0%	10.78

The pH readings of sodium-salts in plasma of pH 7.05 in a concentration of 20%:

Sodium Salt	pH
Sodium sulfacetimide	7.68
Sodium sulfadiazine	9.00
Sodium sulfathiazole	9.28
Sodium sulfapyridine	10.48

pH readings of sodium sulfacetimide in fresh plasma (of different pH):

Plasma pH 7.80:	Concentration:	10%	30%	50%
	pH:	7.98	8.25	8.40
Plasma pH 7.35:	Concentration:	10%	30%	50%
	pH:	7.62	8.00	8.25

High local concentrations depend upon high solubility of the sulfa-compounds.

Solubility of four sodium salts of sulfonamides in plasma (of pH 9.5) and in water at room temperature:

	Plasma	H_2O
Sodium sulfacetimide	52.8%	56.9%
Sodium sulfadiazine	53.1%	51.7%
Sodium sulfathiazole mono-hydrate	25.6%	28.6%
Sodium sulfapyridine mono-hydrate	20.9%	50.0%

The above figures show clearly that sodium sulfacetimide gives in vitro, in comparison with three other sodium salts of sulfonamide derivatives not only the highest concentration but also the lowest pH approaching the normal pH of blood. The only exception is sodium sulfadiazine, which has a slightly higher solubility of 0.3% in plasma.

A definite and important quality of a sulfa-compound is the penetrability into the tissues. Oppenheimer[15] states that "the chemical action of sulfanilamide in a wound does not extend beyond a depth of three mm." At present, we are not able to produce the exact figures concerning sodium sulfacetimide.

At a concentration of 3.33 mg. per litre, sodium sulfacetimide has a distinct effect on the phagocytic index with an increase of 97% and a total increase of leucocytes of 106%. Sodium sulfacetimide does not act as an opsonin, only as a stimulus to polynuclear leucocytes (Czekalowski.[16]) Pus and tissue exudates neutralize to a certain degree the effect of sulfonamides. P-aminobenzoic acid released from bacteria and necrotic tissue antagonizes according to Green and Parkin,[7] the action of sulfonamides.

Bacteriological examinations performed by Pulaski, Meleney, and Spaeth[17] on 200 fresh, untreated wounds showed in 104 cases (52%), Staphylococcus aureus. Next in frequency were hemolytic streptococci, non-hemolytic streptococci, clostridia and enterobacteria. It is well known from other experiments, that Staphylococcus aureus and Bacillus coli, contrary to Streptococcus hemolyticus, are relatively very resistant to oral or parenteral therapy with sulfonamides but are sensitive to local application. Other bacteria, e.g., Pseudomonas pyocyanea and Bacillus subtilis, react best to concentrations approaching the saturation point.

Good results of the prophylactic treatment can be obtained only if the patients are seen a short time after the accident. The best results are obtained, according to Buttle,[18] when the prophylactic treatment is instituted at the earliest possible moment.

Technique of treatment:[19]

Anesthesia (if necessary).

Cleansing with soap and water and rinsing of the wound with copious amounts of warm physiological salt solution.

Thorough debridement with removal of foreign material and devitalized tissues.

Control of bleeding and repair.

Dusting of sodium sulfacetimide.

Primary suturing, if possible and advisable.

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The amounts of sodium sulfacetimide used for treatment were very small, on the average, from 0.25 gm. to 0.5 gm. More extensive injuries required larger amounts, but in our series of cases, never more than 1.0 to 1.5 gm. Jackson[20] uses even in major operations, amounts not exceeding 1.0 to 2.0 gm. Dressings were usually changed after 48 hours and the wound was covered again with very small amounts of sodium sulfacetimide. This compound was re-applied until lacerations appeared to be dry or granulation tissue was formed.

Repeated blood concentration tests on selected patients never exceeded 1 mg. per 100 cc. of blood, and, on the average, showed only traces of the compound.

Series of complete blood counts and urine analyses did not show any deviation from the norm.

The present report is based upon experiences collected in treatment of approximately 900, partly ambulatory patients, over a period of nine months.

The treatment involved all kinds of traumatic injuries as lacerations (cuts), lacerations with loss of tissue, compound fractures, crushing injuries, deep brushburns, etc., mostly obtained in industrial work. Our report is concerned only with patients who were seen a short time after the accident, some of them after a first aid treatment. The results obtained varied according to the amount of time which had elapsed since the accident. The best results were obtained when patients were treated during the first four to five hours after the accident. Less good, but still satisfactory, results were noted when treated after more than five but less than seven or eight hours. The results of treatment after eight hours were questionable. Already infected wounds did not respond satisfactorily to local use of sodium sulfacetimide.

Early surgical treatment and application of sufficient amounts of the compound in fresh, non-infected wounds proved to be highly satisfactory. Lacerations healed *per primam intentionem*, under formation of a normal scar. The period of healing was in no way prolonged. There was no interference with the formation of granulation tissue. Neither local irritation nor systemic reaction was seen in any of our cases.

The local application of sodium sulfacetimide causes a sharp burning pain of short duration and a moderate extravasation, the latter one only in the beginning of the treatment. Slight bleeding accompanied, sometimes, the first application of the compound, probably due to interference with the not yet firmly established blood coagulation. Sodium sulfacetimide was very rapidly absorbed, and no residue or caking was observed after 12 to 24 hours. In none of the 900 cases was either sulfacetimide or any other sulfonamide given orally or parenterally. (The present survey does not include treatment of burns.)

In comparison with other previously used sulfonamides, we incline to give sodium sulfacetimide, from an experimental and clinical point of view, the absolute priority. The results obtained in a large series of cases, over a long period of time, are certainly very good.

SUMMARY: Prophylactic topical treatment with a new sulfonamide compound, sodium sulfacetimide, is discussed from experimental and clinical standpoints.

The results obtained were very gratifying.

Irritations or toxic symptoms were not observed.

[We should like to thank Dr. E. Henderson, of the Medical Research Division of the Schering Corporation, for the generous supply of sodium sulfacetimide.]

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Osteopathy in Industry—The Employer's Viewpoint

MR. LAURENCE ELY,
President, The Reeves Sound Laboratories, Inc.,
New York City

OUR Company—Reeves Sound Laboratories—has been engaged for something over two years in the manufacture of a vital and necessary requirement of the U. S. Signal Corps. Demands for our product—as recently as the Normandy invasion—were as urgent as orders during the months immediately following Pearl Harbor. Back in those days when the strategy of air attacks was forecast, we were constantly reminded that no plane could leave the ground without proper communication equipment. We left Washington conferences with the feeling that if our production lagged, we would be holding back the war.

A businessman commanded by his country to produce for the war effort is faced by a multitude of problems. Raw material must be acquired, equipment found, personnel extended, space provided, and research facilities established, to match and outwit enemy production. These problems will multiply like the proverbial rabbits in time unless a capable group of executives can spread their activity efficiently over a 24-hour, three-shift day. Many men are able to do that for a limited time, but our requirements would knock out the most seasoned performer unless he were kept in tiptop shape.

Keenly aware of the problems inherent in this situation, I persuaded Dr. Sidney Mark Kanév of New York City to spend some time with us each week to keep our executive staff fit and able to meet the pressing demands of the U. S. Signal Corps. Our decision in this instance was made to meet two definite requirements: First, that sickness be prevented to the limit of human ability; second, that if a man should become sick, there would be a minimum loss of time. Our production schedules could not wait for prescriptions to work, and the man must be reassured mentally after treatment instead of worried about his condition.

The announcement that we were to be placed under the care of an osteopathic physician was received with mixed feelings. Few, unfortunately, knew exactly the osteopathic theory or function. Manipulation was construed as a coin or card trick. Structural normality was interpreted as an inference that somewhere in our group a few might be abnormal.

*Delivered before the General Sessions at the Forty-Eighth Annual Meeting of the American Osteopathic Association, Chicago, July 14, 1944; Published in *The Journal of the American Osteopathic Association*, October, 1944.

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Others, of course, pleaded no time, or, just busy. I might easily have found myself in this class except that as things happen in this haphazard world, years ago an acute stiff neck led me to an osteopathic physician's office and made me a real disciple of Dr. Still. About 10 years later, an osteopathic physician brought my youngest son successfully through a very critical case of pneumonia. At this time that same lad is in perfect health and, with his brother, is a veteran of two icy winters in the North Atlantic on submarine patrol.

Dr. Kanév laid out a small treatment room in a corner of our plant, and with some modest equipment undertook a program of fitness with our staff. As the men responded to his care and treatment, our production and morale immediately reflected the benefits of consistent attention.

It was at this point that several very important facts forced conclusions on me that have since become such firm convictions that for the rest of my business career the health of my associates and employees shall be a major consideration. The improvement in morale was the most pertinent factor.

Industrial engineers, consultants, and experts had from time to time made recommendations for sustaining morale. But our best leaflets and slogans could not stop clashes between tired department heads, with 20 or 30 hours steady work behind them, exerting every ounce of nerve, skill, and genius, in one of the most important jobs American workmen were ever called upon to do. Our difficulty was that the men were not sick; there was no organic or evident disturbance that would suggest a doctor, but exhaustion and overdrafts on nervous systems required treatment. After a few months the results proved that the application of the osteopathic principle was definitely indicated and must now be pronounced successful.

The next and most critical condition required a step in the direction of what we are beginning to call "enlightened management." We had always had available a dispensary for treatment of emergency first-aid cases. Designed for immediate remedy of minor or occupational injuries, a record of the cases treated soon proved that these cases were very few and the percentage of hysteria cases was increasing impressively as the war progressed. Practically every one of our workers had some member of his or her immediate family in the actual fighting forces, and as these men left for overseas and battle, casualties began being reported from all parts of the world. Our personnel (about 80% of whom of women) were confronted with a most acute emotional situation.

Then another problem popped up that began having a serious effect on our vital production. We are located in the very heart of Times Square; workers begin their day after a ride in crowded subways or buses, and almost use the energy for a day's work to get to work! Broadway amusements available to the shift leaving at midnight robbed many of our people of required sleep, and overtime that was frequently required to fulfill commitments furnished extra money for such amusements, creating a vicious circle that could easily hamper air actions over all the theaters of war.

Confronted with such impediments we might have been baffled completely had we not found the solution in the treatment of our executive staff, now operating like a smooth-running, well-oiled machine. It did not require second thought to turn our entire problem over to Dr. Kanév, carte blanche, confident that he could do what the beat-the-drum school of ballyhoo had not done—cut down absenteeism, bring up production efficiency, and duplicate the condition at the top of the organization. Dr. Kanév extended our facilities and undertook this very difficult, intangible job. The figures of the results are most impressive and will be covered thoroughly by Dr. Kanév himself.

The workers were slow to accept the plan of visiting a doctor without obvious illness, and there were other discouraging factors. Our help just could not believe that the services of our infirmary were free. Rumors were prevalent and for weeks we were in a maze of misinformation, malinformation, and no information. Well, the law of averages takes care of rumors, too, and one day an employee with a reputation for quick wit visited Dr. Kanév for treatment of a "kink" in his shoulder. Returned to his department he was asked if the "doc" had straightened him out. He replied quickly, "That guy could straighten out the Hunchback of Notre Dame." This was quickly retailed through the plant and soon attendance, for conditioning, at the hospital became routine for all of our people.

In an extraordinary environment, pressed by a critical phase in the war operation, with a personnel of almost 2,000 people, our company has twice been awarded the Army-Navy E. It is my sincere and considered belief that one of the important factors in that achievement has been osteopathy.

When we convert to peacetime production, we will continue this invaluable practice of keeping our people mentally and physically fit. We are convinced that a healthy personnel, happily engaged, will put something of how they feel into any product we make.

It is significant, too, that we have had no labor trouble, very little grousing, and no griping.

It is unfortunately true, especially in the larger cities, that medical care is available largely to two classes—the very rich and the very poor. The middle class that finds these benefits often out of reach are the very people we employ. Whether it is the province of management to provide for its personnel the advantages of surgery and constant health care may be a debatable question. But provision for preventive treatment, maintenance of an industrial infirmary—the business of keeping people well—whether the duty of management or not, is unquestionably good business.

Osteopathy in Industry—The Industrial Physician

SYDNEY MARK KANEV, D.O.,
New York City

IN ANY war there are two fronts: (1) the military and (2) the production front. Each is necessary to the other, and without either, the war cannot be won.

Osteopathy's place on the military front has, to say the least, been embarrassing. Most unfortunately, it has been denied the privilege, honor, and opportunity of serving its country on this front. It cannot be honestly denied that in modern warfare, which has introduced air power and ground mechanized units, there is a crying need for osteopathic physicians.

Osteopathy, however, has found an opportunity to serve on the production front, and it is concerning this front that this paper is written.

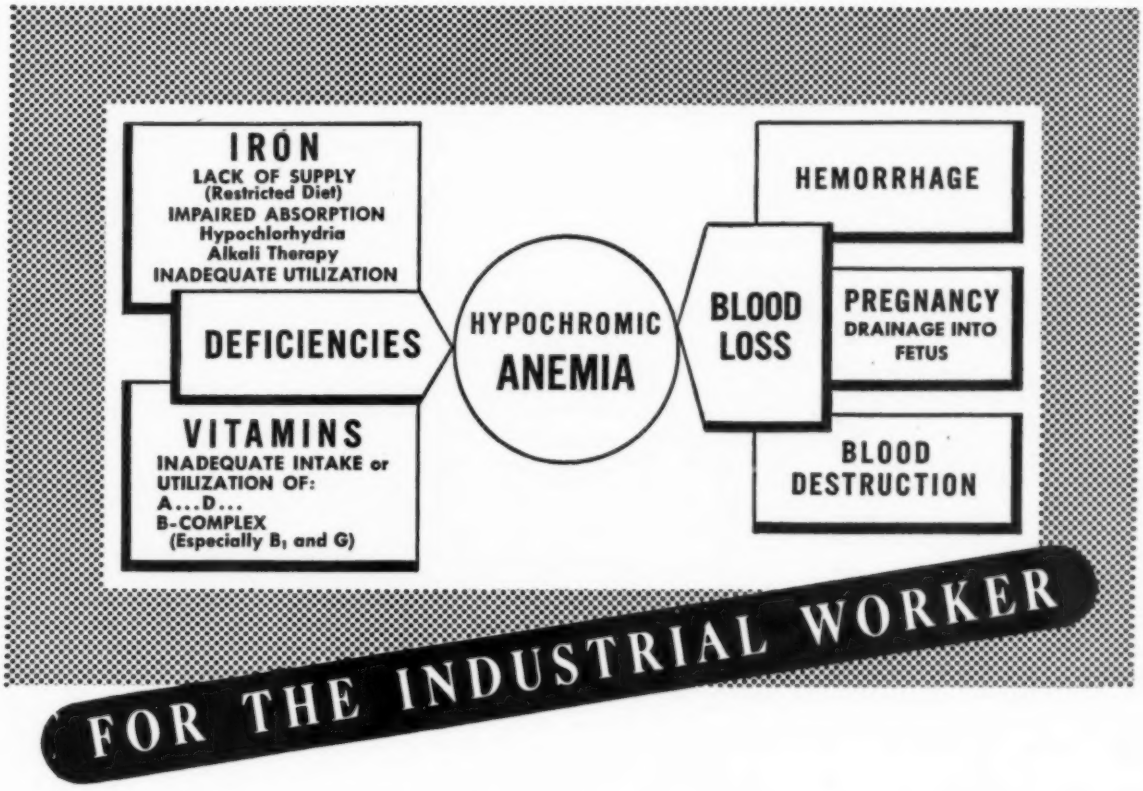
If what experience I have gained in this field can be of help to other osteopathic physicians in establishing themselves on the production front, or in postwar industrial America, it will give me inestimable pleasure. If any of the information, facts or figures presented here should prove of value to the osteopathic profession, the effects will indeed have been worth while.

On July 9, 1942, I received a communication from the War Department which caused me no small amount of frustration and unhappiness. I had sought an opportunity to serve my country in the manner in which I was best suited, by virtue of training and experience, even though I was above the draft age. My qualifications were unacceptable!

Knowing full well that as far as the Medical Department of the Army was concerned, the letter was final, I decided to seek another avenue in which I might serve my country.

Practically all war plants were closed to osteopathic physicians as such, and most of the executives were disinterested in osteopathy or too busy to give it their attention.

It was not until some months later that the opportunity presented itself. One of my old patients, a long time friend of osteopathy and a man of broad vision, came into my office and asked me what my thoughts were concerning osteopathy in a war plant.



The worker cannot be expected to deliver quality products if his tools are in impaired condition. Neither can he achieve maximum production if his physical status is below par.

Secondary anemia, encountered with increasing frequency among industrial workers, makes for easy fatigability, reduces efficiency, and—by lessening acuity—contributes to accidents. Correction of anemia thus is a major concern in industrial practice.

Heptuna provides all essential factors needed to restore not only the blood picture but the patient as well. Since this anemia usually is the result of multiple nutritional deficiencies, Heptuna proves particularly applicable.

In addition to an adequate amount of highly available iron it provides the fat-soluble vitamins A and D, and the B-complex vitamins (partly derived from liver extract and yeast) essential to iron utilization, better appetite, and improved endurance. In most instances one capsule per day together with the daily diet proves adequate in correcting the anemia.

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Heptuna

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Ferrous Sulfate	4.5 gr.
Vitamin A	5000 U.S.P. Units
Vitamin B_1 (1 mg.)	333 U.S.P. Units
Vitamin D	500 U.S.P. Units
Vitamin G (0.50 mg.)	500 micrograms

together with liver concentrate (vitamin fraction), derived from 4 grams of fresh liver, and dried brewers yeast.

Mr. Laurence D. Ely was that man, and it did not take very long for us to enter into the possibilities of osteopathy in his business. We concluded that here was not only a great opportunity for higher efficiency among his employees in expediting their war efforts, but here was also a grand opportunity for osteopathy to show what not too many people knew could be done.

Not many days later we were measuring and sketching plans for a hospital infirmary at Reeves Sound Laboratories, Inc. This infirmary was to be manned by an osteopathic physician as medical director, and three nurses and a secretary as assistants. Due to the unique location of the laboratory, it being the only war plant situated in the heart of Times Square in New York City, where cost of space is very high, many problems immediately confronted us regarding the proposed size of the quarters. Mr. Ely, despite the many overburdening problems which must confront any individual just organizing a war plant, helped personally to plan the hospital. Little did we know then that this factory was subsequently to become the largest manufacturer of its kind in its particular field, to be twice cited with Army and Navy "E" awards, and to rise from 250 employees to almost 2,000. From the very start, Mr. Ely was insistent that the hospital have as much space as I considered necessary and that it be equipped in the manner which I considered best befitting its management by an osteopathic physician.

As a consequence, the choice of space, its location and amount had to be carefully considered. Here was a plant with about 250 employees, and who could tell to what proportions it might grow? We had further to consider light, heat, accessibility to the rest of the factory, nearness to the personnel department, noise, air, water, toilets and innumerable other details. Not a small consideration, too, was the ever-present fact that as an osteopathic physician I should need additional room for administering osteopathic manipulation.

We finally decided on a space 18.6 by 20 feet, roughly 400 square feet. This we divided into a combination nurses' and reception room, an osteopathic manipulation room, a room for ear, nose and throat and minor surgery, and two rest rooms. One of these rest rooms would be used for rest and dressing purposes. The other would serve as a dressing room, rest room and ultra-violet radiation room. Although compact and not too spacious, we felt we could operate comfortably and efficiently, and still keep our footage cost down as low as possible.

Under the law regulating the practice of osteopathy in New York State the scope of practice is broad enough so that we may cover all the practical aspects of industrial medicine with the exception of major surgery, which is practised in very few industrial plants of any size. With this in mind we equipped the layout in a manner similar to a busy osteopathic physician's office, where every emergency of acute practice might be taken care of with speed and efficiency. Had we been given unlimited space, as we will have when we move our plant in the near future, it would have been possible to provide several rooms for nose and throat practice and several rooms for osteopathic manipulation.

We staffed our infirmary with three registered nurses, carefully chosen for experience, ability, and personality. Although trained in M.D. hospitals these nurses had a working knowledge of osteopathy and its scope. They were to accept the responsibilities which were to go with not only industrial nurses working under a new type of direction, that of an osteopathic physician, but also with a modern employer's new order of things—an order which sought to gain the highest efficiency from an employee by treating him more generously than labor had ever been treated up to that point—with a few possible exceptions.

I must digress for but a moment to say just a few words in behalf of the management of Reeves Sound Laboratories, Inc. Where one has the good fortune to meet an employer broad enough to accept osteopathy as a factor in war and industrial production, such as Mr. Ely, one must, *per se*, expect that employer to have the same broad view concerning other factors in labor-management relations. At Reeve Sound Laboratories employees enjoy conditions which most workers in industrial fields will not become a part of for the next 10 to 20 years. With the exception of one other of those plants I have thoroughly studied during my tour and study of war plants, that of Jack and Heintz, at Bedford, Ohio, I found none like this, where our workers are considered equally as important as management. They receive free medical attention, not only as a prophylaxis, but also for illness which might show up in their physical examinations, for illness contracted in their work, and for illnesses which they might develop independently of their occupation. They receive, at no cost to themselves, eight ounces of milk and carefully selected biscuits twice a day, brought around by a company matron. In addition they are furnished at no cost with vitamin and mineral capsules about which more will be said later. They work in clean, air-conditioned roomy areas, under supervisors instructed in the rights of subordinates. There is music with their work, rest periods, an understanding and carefully chosen personnel department. Promotions come as fast as ability warrants and rewards in dollars and cents are forthcoming for helpful suggestions. In short they are members of a happy and healthy group, whose every effort is to do their bit to help bring this war to a successful and quick end.

And so, with a modern, air-conditioned, well-equipped hospital, intelligent nurses, an efficient secretary and a modern cooperative management, we started "off to war."

In the east osteopathy is not as well known among all classes of society as it is in the midwest or west. As a consequence there were multiple problems to surmount from the very start. To begin with, some of the executives were opposed to—as one senior partner quite openly put it—"carrying the torch for osteopathy." The production department, being chiefly interested in bigger turnout, was not "too keen on experimenting with osteopathy," more especially since it seemed to take time away from work. Most of the employees had never heard of osteopathy or confused it with a form of adjustment which daily brings a very familiar and irritating question to the ears of every osteopathic physician. And it seems hard to believe, but some of the employees had never been to any kind of doctor during their entire life, and were frightened to death at thought of a physical examination. Some of the fantasies concocted in the minds of fearful employees as to what actually took place during the infirmary physical examination which they had not yet received would make a comedy in themselves. Then, again, we were to meet with an entirely different people from those who make up the ordinary metropolitan (New York City) practice. These were people with limited education, people from very poor environmental surroundings, people who were orthodox, not only in living but in the choice of physicians.

Time, of course, has been the big factor and just as osteopathy has grown with the efforts of every practising physician, so one by one were we able to overcome most of the objections to osteopathy from the top executives down. There still are some who will not accept our help, or at least the manipulative phase of it. From the very start manipulative therapy was never forced upon any individual. It was merely offered, and where reluctance was shown, it was either omitted temporarily or administered in a very careful, cautious, gentle manner, until such objector was convinced — "Gee, this really makes me feel much better."

This plan was followed very carefully and bore fruit. Originally it was intended that the medical director take executive charge of the infirmary and its staff and at given hours treat osteopathically the executives, foremen and key workers—the thought being that a key worker off the job would throw many subworkers off production. So rapidly did osteopathy take hold that within a short time after we had organized, we were flooded with requests from all branches of the plant for osteopathic manipulation. This ultimately brought forth a note from our president, requesting that I take on an-

The Acuity Curve

That the increased rate of accidents occurring in industry during the late morning hours—attributable to lessened acuity on the part of the worker—is largely of nutritional origin is indicated by the concurrent appearance of other signs of untimely fatigue.

Thus the admonition, that the worker eat an adequate breakfast, appears more than justified. While the lack of a sufficient morning meal obviously is not the only causative factor in accidents, in all-too-many incidents it may carry the major part of the responsibility.

Medical and nutritional authorities both recommend that the worker's breakfast should be from ¼ to ⅓ of the day's total food requirement.

In such a breakfast, cereals (whole-grain, enriched, or restored to whole-grain values of thiamine, niacin, and iron) may well have a permanent place. Their diversity of taste and kind is so great that cereals may be depended upon for morning menu variety.

The nutritional contribution made by the dish of cereal suggested is shown in the appended table. When 1 oz. of cereal is eaten with 4 oz. of whole milk and 1 teaspoon of sugar, this palatable combination of cereal (ready to eat or to be cooked), sugar, and milk contributes protein of high biologic value, readily utilized carbohydrate, well-emulsified fat, B vitamins and minerals:

Calories	201
Protein	7 Gm.
Carbohydrate	32 Gm.
Fat	5 Gm.
Thiamine	0.19 mg.
Riboflavin	0.27 mg.
Niacin	1.82 mg.
Calcium	158 mg.
Iron	1.73 mg.

The presence of this seal indicates that all nutritional statements in this advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

CEREAL INSTITUTE, INC.
135 SOUTH LASALLE STREET • CHICAGO 3

other osteopathic physician, in order that our plant might be covered at all times.

Plan of Operation

THE staff of our infirmary consists of (1) a registered nurse for each shift, (2) a secretary who works during the daytime, (3) a senior attending physician and (4) the medical director.

Duties of the Nurse—The nurse on duty is responsible for her shift and answerable only to the attending physician or the medical director. She has full authority, in the absence of both of the physicians, to dispose of a case in the manner in which she deems best. She receives each patient and determines the next step to be taken. Where the services of a physician are not indicated, she handles the case in accordance with a previously prescribed method laid down by the director and makes full notes as to complaint, duration, treatment, and progress, in the nurses' daily record book. If there are any complications, or if further treatment or study is necessary, she informs the physicians, or in extreme emergency she is authorized to hospitalize a patient or secure such aid as is imperative.

She keeps a daily record of all patients whom she sees, arranges the physician's session, assists in certain aspects of the physical examination, such as checking blood pressure and pulse, eye chart examination, weight, height and history. She assists with the laboratory procedures, applies surgical dressings, prepares patients for minor surgery and manipulative or general treatment. She keeps a close check on supplies, and the night nurse, whose shift is comparatively lighter, refills and re-orders supplies. Routine treatment such as ultraviolet radiation, parenteral injections, prophylactic care of females during the menses, psychological advice, are constantly being administered by the nurses.

In addition the nurses attend to the periodic examinations, and special examinations such as the periodic three-month blood count given all employees working with x-ray machines. They check on those under luetic treatment. They note fully plant conditions which might necessitate the investigation of the physicians, like industrial hazards, contamination possibilities, infectious or contagious disease and other unhygienic conditions.

From the numerous suggestions and fine cooperation of these skillful nurses, not only has the work of the attending physicians been made less taxing, but efficiency has been increased multifold. They are in substance the backbone of the infirmary and it is necessary that they be reliable, sober, healthy and osteopathically minded, even though trained in M.D. institutions. In achieving the last mentioned situation, the physicians have carefully educated them first, as to the osteopathic legal status, scope of practice, principles of osteopathy and the practice of osteopathy. The physicians have given them osteopathic manipulation and have always been open-minded about the other branches of medicine. The status quo between physicians and nurses has been carefully and intelligently adhered to and at no time has the importance of these nurses been overlooked, either in the field of direct praise or in company publications. This has paid big dividends. It has been our observation that nurses for this type of work should have a good practical clinical experience, be modern in their ideas, and be young enough to be tolerant of this particular type of patient.

The secretary has charge of all records, telephone calls, absentee records, compensation forms, labor board and insurance company matters.

The senior attending physician attends the infirmary each session and treats all cases, acute, chronic and accidental. He exercises complete authority while he is on duty and he, too, is an osteopathic physician.

The medical director is in complete charge of the health of all the employees of the company. He is answerable only to the president of the corporation. All matters pertaining to the health or safety of the employees or executives and the management of the hospital are his responsibility. Any controversy resulting from treatment, care or conduct at the infirmary falls squarely upon his shoulders. All communications regarding the health or safety of any employees carry his signature. He attends the infirmary daily in sessions of two hours each. He acts as safety engineer, and maintains active communication with the directors of the company, the personnel division, the foremen and the supervisors.

All compensation cases are seen at each visit by the medical director and never by the nurse alone as is common practice in some medical infirmaries. This in itself is an important item, since it enhances the chances for an earlier return to work on the part of the employee.

Modern Methods at Reeves

IN REEVES Sound Laboratories infirmary the medical director has been given carte blanche by our far-visioned president, and never once has there been any question concerning the cost or manner of treatment. Working under such ideal conditions naturally is conducive to higher efficiency and better results and the cost of managing our medical department has been surprisingly low. It is our belief that where such a practice is followed, much time and energy is saved, and the dollar spent is of greater value than in the case of a flat budget for medical expenses, to which one must strictly adhere.

In our infirmary we distribute any adjuncts which we believe may increase the efficiency of the employees, free of any charge. In the case of injury we supply any adjunct necessary to assist in the relief or cure of the patient.

In special cases, for instance in menopausal conditions, where glandular preparations are used parenterally, the patient pays the wholesale cost of the estrogens, and the same is true in the use of allergic extracts, insulin, et cetera. No charge of any kind is made for any other service delivered by either the physicians or the nursing staff.

We occasionally find employees who inquire about private treatment, but this is discouraged with anyone employed in the plant. We feel that they must be made to understand that they are receiving the same sort of care we render our private patients. We have, however, found that many of the employees have asked us to treat members of their families and this we do in our private practice.

One of the largest cost items connected with the medical department is the result of free distribution of our multi-vitamin-mineral tablets. These tablets wrapped in individual cellophane bags are distributed to each employee daily at the time clocks. Each tablet contains the minimum daily requirements of vitamins A, B, D, G and C. We are all well acquainted with the fact that due to the scarcity and high price of many food items, rationing of foods and inability of many people who work to find time to purchase proper food, there are a great many more poorly balanced meals than in normal times. We have found that despite the high cost of these vitamin-mineral tablets, the added chances for maintaining health and higher resistance of our workers make the investment a good one.

Examinations

WHEN an employee applies for a position at the Reeves Sound Laboratories, Inc., and passes all the requirements for his particular job, he is given a slip and taken to the infirmary for his pre-employment physical examination.

When he enters the infirmary he is supplied with several forms. The first is a consent and release which he signs. This is of the utmost necessity. The document becomes the joint property of the Laboratories and the examining physician. The law in New York State, and I am sure in most states, does not permit the transmission of confidential information regarding a person's health, from a physician to any other person, unless the permission of the person is obtained. Failure on the part of the physician to protect himself might make him liable to a lawsuit which could be very annoying and costly. Naturally, information of an adverse nature is of the utmost importance to the employer, especially in a war plant, and certain positive findings immediately disqualify an employee. This, then, is our means of self protection when health information of an important nature is passed on to the employer.

Consistently proving their

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feature undeviating qualities that facilitate the more successful attainment of the surgical objective

IN COMBINATION, the distinctive features which characterize these widely preferred surgical blades afford the optimum in cutting efficiency. They provide superior sharpness with uniformity. Greater strength is attained by the exclusive application of the Rib principle of blade reinforcement. All are qualities which contribute to long periods of satisfactory service and virtually eliminate the element of distractive influence.

The quality of Rib-Back Blades has suffered no wartime change. They continue to be offered at the lowest price consistent with their inimitable precision qualities.

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Danbury, Connecticut

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The second form is a personal history of past or present illness. This constitutes a statement of the employee regarding his health history. It is signed and witnessed and acts as an admission or denial of conditions which are known by the applicant to exist in his physical makeup. It is compiled in such a manner as to divulge existing conditions which might not be picked up on the examination and it covers illness which might impair the employee's efficiency or the health of his co-workers, or lead to an industrial disease or injury. If this history is satisfactory, blood is taken for a Wassermann test, and a complete physical examination is given.

The results of the physical examination are recorded on a chart and if there is any question in the mind of the examiner as to any phase of the findings, further tests such as x-rays, blood count, sedimentation rate, etc., are ordered, all at the company's expense. The employee is then graded Class A, Class B (one plus), Class C (two plus), or Class D (three plus).

Class A denotes that he is physically fit for any type of work. Class B, or one plus, means that there exists a defect which is negligible or correctible and that the employee is otherwise fit for any work. Such findings as bad teeth, hypertrophic tonsils, epidermatophytosis would fall into this class. Class C, or two plus, means that the defect limits fitness for work. It may or may not mean the need for medical attention, but does indicate the need for medical supervision. Such conditions as arrested tuberculosis, weak inguinal rings, chronic sinusitis fall into Class C. Class D, or three, plus signifies that a defect exists which requires medical attention and disqualifies for employment. Such conditions as active tuberculosis, hernia, chronic bronchitis, epilepsy, fall into this class.

Notes of findings atypical in nature are made under "remarks" on the chart and all class C and D charts are immediately sent to the personnel division where they are assigned or disposed of as seen fit by that department.

To date we have given a pre-employment physical examination to well over 1,500 applicants and we have been able to accumulate some very interesting facts concerning them. For instance, those with the poorest education and social background seem to have been the ones whose early life had been greatly neglected from a health standpoint. In these individuals we found most generally poor or bad teeth, either the result of neglect or improper diet. Next we found diseased or enlarged adenoid or tonsillar tissues or both. Many revealed a lack of hygienic education and in a great many cases the applicant never had had a physical examination or even visited a doctor from the time he was born.

Out of 1,095 persons examined for syphilis by the Wassermann test we found 18 positive reactions, eight in whites and 10 in colored. The employment ratio of colored to white persons examined is approximately one to eight. Careful study of all positive cases as to the possibility of infecting fellow workers showed none to be of such a nature that co-workers might be infected. Every individual so afflicted was consulted privately, advised of the existing infection and given a careful lecture on the condition and its sequelae.

They were advised that unless they resorted to antiluetic treatment at once they would not be permitted to remain in our employ, that arrangements had already been made with the U. S. Public Health Service for them to receive such treatment without cost, and that Reeves Sound Laboratories, Inc., would permit them time off from their work, with pay, to go to have this treatment. They were told that if they preferred, they could have the treatment by their own private physicians, but that under no circumstances could they remain in our employ or be considered for employment unless they went regularly for treatment and brought back a note affirming that they had been attended properly.

It is our pleasure to report that every case consented to go for treatment and has been going steadily for more than one year. Already we have had one reported cure and it is our opinion that if every employer throughout America were to take this same attitude, the incidence of syphilis would be markedly reduced. We feel that in this one phase of preventive medicine we as osteopathic physicians have made a very special contribution to the public health by our effort in cooperating with the U.S.P.H.S. in stamping out this dread disease.

ONCE an applicant is accepted for employment, the medical department will not see him again until he reports for his periodic three-month check or for some ailment or injury. In the latter case he will present a sick pass to the nurse or secretary on duty, and will then remain seated immediately outside the infirmary until he is called, unless his is an emergency case. If the case is such that it can be cared for by the nurse, she will give it the necessary attention, making a proper record in the nurse's day book, and on the patient's personal treatment record. Later the secretary enters it on the nurse's daily report. If the case requires the attention of the physician, the latter examines and treats the employee, submitting such information as he feels is pertinent to the nurse or secretary. This record is made upon the patient's treatment card and then on the physician's daily record sheet.

Preventive Osteopathy.— We have tried to institute a method whereby all executives and key workers are called by the secretary at regular intervals for manipulative treatment. This takes about 15 minutes of their time, once or twice a week.

Employees know that the facilities of the infirmary await them at the first signs of illness, and the ill employee usually reports to sick bay for advice. In most instances, and unless the patient shows symptoms which warrant his being sent home, he returns to his specific job. It is interesting to note on the records, which are accurately kept, the small percentage of cases which were absent, if they have reported to the physicians for early care of their complaint.

In case of an acute condition which might be responsible for the spread of contagious or infectious disease, the ill employee is sent home and paid for the day.

Physician's Procedure in Acute and Surgical Cases.—In acute and surgical cases we use accepted therapy as is authorized us under the laws of the State of New York. Manipulation is administered wherever possible unless the patient objects. Sooner or later, without our pressing the manipulative phase of treatment, the employee usually comes around to ask for it.

Naturally not all employees visit the infirmary. There are many who take ill suddenly at home and cannot report for work. There are those who do not wish to avail themselves of the company osteopathic physicians, and there are those who prefer their own D.O. or M.D.

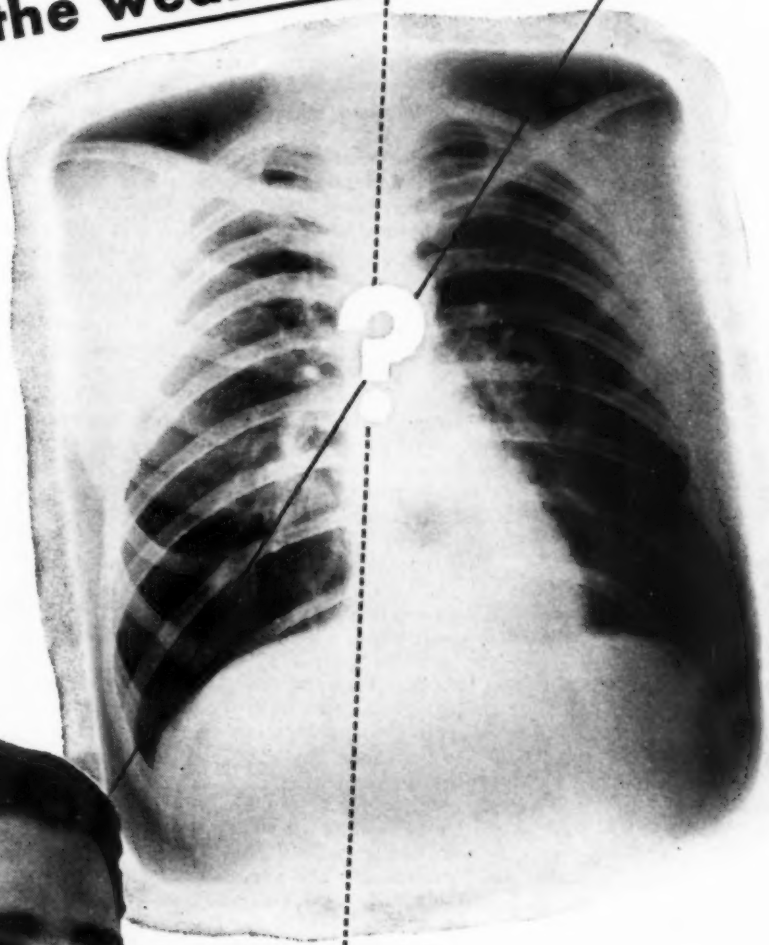
On those who do avail themselves of our services we have been able to compile statistics which we believe show the importance of osteopathy in an industrial institution. It will be noted that of 2,534 employees who visited the osteopathic physicians during a period of 35 weeks, only 115 were obliged to absent themselves as a result of illness. This brings the percentage of absenteeism among those treated for illness or impending illness by plant osteopathic physicians to 4.5%. Here is proof of the value of osteopathy in industry and in cutting down absenteeism due to illness. Not all those cases were amenable to manipulative care alone, but certainly those which were, outnumbered those which were not. It seems needless to say that the osteopathic manipulation given to the employee is specifically aimed at whatever his complaint may be. It is of short duration, and unless given as a prophylactic measure it is not generalized.

Occupational Complaints.—One of the most interesting phases of an industrial physician's life is the constant problem of what to do with multiple occupational injuries or diseases which constantly appear to tax the ingenuity. Second only to acute ailments, occupational complaints will consume most of the plant physician's time.

We have learned one rule which we follow explicitly. We try to seek out the next source of occupational illness and prevent it if necessary.

Mass Hysterias.—These are pseudo-

is this the weak spot in your production?



AO Respirators safeguard his lungs—protect your production

AO Respirators provide protection against dusts and noxious fumes which can sap a man's energy and cause his lungs to lag on the job.

Check the possibility of such weak spots in your production . . . by calling in an AO man to help formulate an effective respiratory program. AO makes a wide range of respirators to protect against various hazards. You'll also find AO's new respirator leaflet helpful. It contains a chart which suggests the proper respirator for 139 hazardous jobs that endanger the lungs. Write for it *today*.

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industrial disabilities, psychic in origin, and whipped up with tremendous impetus, somewhat as occurs in insidious political or social propaganda. One employee complains of a new malady. She tells her fellow worker it is caused, let us say, by carborundum dust or oil. The fellow employee feels that she too has queer symptoms, and remembers that a friend of hers told her of her friend who had had similar symptoms and is now seriously ill. During the periodic rest periods, the gravity of the friend's friend's symptoms rapidly increase and suddenly the infirmary is flooded by employees with carborundum under their nails, in their eyes, up their noses. They are choking from its inhalation, or suffering gastro-intestinal complaints. Work is, of course, immediately curtailed and news spreads to other departments where several days later the oil, which for months has been the same and never caused anyone any trouble, suddenly starts to make someone nauseated, or a series of acid burns suddenly appears, or the tips of the fingers suddenly become denuded from a rubbing process which the same employees have made use of for months before, without injury to their fingertips.

Fortunately, we have never been in that unenviable position of permitting an hysterical situation to exist very long, and this is another spot where quick thinking nurses and physicians, with a working knowledge of the factory operations and psychiatry, must operate with a swift and full degree of positiveness. These patients are examined completely and carefully, and handled with great psychological care. An immediate trip is made by the physician on duty, or one of the nurses, to the department, whence is coming the complaint. Work is stopped for a few minutes and a talk is given reacquainting the employees with the fact that over-emphasis is placed on the safety factor in the prevention of disease. It is recalled that for months no one has complained of a similar condition, and suddenly everyone is going haywire. The doctor or the supervisor goes through the same procedure that the employee is going through. If there is a fume or supposed fume situation, the doctor approaches the fume area and points out the accident and health prevention measures taken, and the blower which is working. He sticks his nose up close to the fumes.

There are times when the doctor goes through this with the individual, rather than with the group. That is usually sufficient to effect a cure, and nowhere in the entire practice does the good will already set up by the medical staff play such a decisive and important role. The mere fact that the doctor or nurses show enough interest to come to the immediate help of the employee, instills a confidence which makes what the doctor says O.K. Before very long the employees are back on the bench and the hysterical symptoms disappear.

Occasionally, and in spite of every effort made, one or two employees will remain steadfact in their contentions. It is a proved fact that invariably these employees are on the lowest level of the production scale. In these isolated cases, they are usually treated symptomatically or even with the application of a placebo, sent home for the day and treated for several days with proper psychological therapy.

Naturally I had little or no previous experience in industry prior to entering the Reeves Sound Laboratories, Inc. I had served as a member of the Compensation Law Board of the New York State Osteopathic Society. This entailed a study of its laws, and the laws of industrial medicine, whence much important industrial knowledge was gained. As soon as I was engaged to handle the industrial problems of the laboratories, I sought the best books on the subject and gave them careful study. Two of these are named in the references. These were in no small way helpful, for on our second day of duty at the plant we discovered a very dangerous preparation from the standpoint of industrial health. This was being used openly and without knowledge of its danger. It was a chlorinated hydrocarbon preparation which could produce and had produced serious liver damage in persons handling it or inhaling its fumes all day. Immediate steps were made to replace this important substance, about which much has been written in medical journals. Each employee who had ever worked with the substance was immediately examined carefully and given an icteric index test. Fortunately no one had as yet been hurt.

The next big problem was the oil and cutting oil dermatoses found in every factory where cutting oils are used. The management had suggested when first I started that I take several trips to any war plants of my choice and several of their choice, visit the medical divisions, and gather up whatever material I thought might be of value to our infirmary. These visits proved invaluable later on in the solving of problems as they arose. We experimented for a long time both in the prevention and in the treatment of cutting oil dermatitis and before long we had a satisfactory control of this perplexing and production-delaying complication. If we were to discuss the oil dermatoses we could probably go on for a full day and then still have more to say. Much enlightening material has appeared in various books on industrial medicine, in pamphlets by the U. S. Public Health Service, and in the many medical and industrial journals. One cannot, however, lay down hard and fast rules for the control of oil dermatoses, for each cutting oil, as does each employee, presents a different problem and different idiosyncrasies. We would better lay down a blanket group of suggestions which every individual interested in this problem might follow:

1. Elimination from using cutting oils of those employees who by history, physical examination or contact, hint or show a sensitivity to skin irritants which do not commonly affect the average individual—such persons being those who fall into the allergic group, those with visible skin conditions, those with histories of skin sensitivity and those in whom the examining physician will at once recognize a thin, sensitive skin.

2. The use by those permitted to work with the cutting oils of (*a*) protective hand and face creams (*b*) latex gloves for the hands in some cases, latex arm sleeves in other cases, (*c*) proper washing facilities and proper instructions in the art of washing the hands and face, and the use of a bland, non-irritating soap.

It might surprise one to hear that on routine inspection which is made at regular intervals through the plant, I find time and again abrasive soaps (the so-called sand soap) being used by employees simply because it saves time in the hand washing process. So important is this hand washing process that one of the largest and most modern plants in the world, one which I visited, pays its employees working in one division, ten cents each time they come to the wash room for hand cleansing purposes. This organization has done more toward the prevention and treatment of lead poisoning than any other that I know of. Their alert medical division found very rapidly the value of careful washing of the hands and face in the prevention of industrial injuries.

Further preventive measures include:

(*d*) Careful choice of good grade cutting oils and the proper care of cleansing, dilution, and changing of those cutting oils, as well as the cleansing of the receptacles which hold them. (Unclean oil tanks are the breeding place of billions of pathogenic bacteria which play no small role in the production of the dermatoses.)

(*e*) Most important is the immediate change in occupation of those showing signs of dermatosis. It has been our policy to advise the supervisor that an afflicted employee be removed from the oil cutting department and placed on dry work. Whatever measures we deem necessary to use from a dermatological standpoint (and these are as varied as are the types of dermatitis) are employed. If the patient develops complications or does not respond, we refer him to our specialist in this field. The treatment thereafter is usually of long duration.

(*f*) The changing of working clothes is the last and not the least in importance in prevention. Cleanliness of lockers, and fresh street clothes once the employee has finished his work, are very important factors. Most large industrial plants have a change in laundry (work clothes) twice a week, some daily, plus two lockers for each employee, one large

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locker for the clean street clothes and one half locker for the dirty work clothes and shoes. Of course there are many more modern measures which may be taken, such as showers, et cetera, but one must remember that most war plants have grown very rapidly with thought on production as the paramount factor.

We have found two protective creams, after long study and experimentation which in our particular instance seem to be ideal. One of these is a cream manufactured by the Dupont Company called Protek (Dupont) and the other is a combination of zinc stearate, potassium stearate and stearin, propylene glycol mono stearate, di-ethylene glycol mono stearate, yellow petrolatum, titanium dioxide, parahydroxi methyl benzoate, water and perfume. These are supplied to the workers who are subject to cutting oil dermatitis or exposed to those oils which might produce a dermatitis. The worker receives a new jar upon request and upon return of the old jar.

The physician will find much in an industrial plant that warrants correction from a health standpoint. In the effort of the production staff to lower cost, safety measures which to the non-medical mind sometimes seem superfluous are often discarded. Architectural and planning errors may even be responsible for serious problems. I can recall one of the processes in production of our crystals, which required dipping of a natural mineral into a receptacle containing oil, prior to its being x-rayed. In handing the product to the x-ray worker, the employee was obliged to lift the small item up to an open window entering into the x-ray division. On one of my routine inspections, I watched this process and noted that as the employees picked the product out of the tank and placed it on the adjacent high shelf, oil dripped down their arms. Within a few minutes the arm plus the sleeves was entirely covered with oil. Inquiry revealed that there was no particular reason for the high window, other than that the original layout had been set up in that manner. A window was made on a level with the tank and the dermatosis in that department was immediately cut down.

We found that the use of masks and proper exhaust systems reduced the irritations due to carborundum dust and fumes.

We found that rubbed fingers in certain operations at the plant were made tougher by repeated application of tincture of benzoin over the skin which was constantly irritated in this particular process.

We found that periodic talks to small groups have prevented x-ray burns, acid burns, and minor irritations.

Types of Cases Seen by Osteopathic Physicians—Almost every type of case which comes to the physician in private practice, plus those of occupational origin, is seen daily in our infirmary. It is very interesting indeed that in our plant complaints affecting the extremities and the back, cases which are so generally thought of as falling particularly in the osteopathic field, should in our classification of illness table be second on the list of types of cases seen. We have taken 2,534 cases, which we saw during a period of 35 weeks chosen at random between May, 1943, and June, 1944. Of these, we found that complaints affecting the nose, throat and upper respiratory tract totaled 1,202, purely structural complaints totaled 546, the miscellaneous group consisting of gynecological, psychiatric, ears, and genito-urinary totaled 220, abdominal 183, minor surgery 179, skin 114 and eyes 90.

A great many cases which we see have to do with personal psychological problems. These are handled with great care and always with one thought in the physician's mind: "Each man's problem, no matter how small it may appear to us, is the most important problem in life to that individual." Sex hygiene, menstrual problems, pregnancy problems, family problems, are just a few of the many complaints with which people come to our clinic.

We have a dental consultant who has arranged for a group of dentists of good reputation, and a dental clinic of one of the largest hospitals in New York City, to handle the teeth problems which seem to be our number one positive physical finding on pre-employment examination. This work is done at a fraction of the cost of such services to the average patient. We keep after our employees to take care of their dental work while they are earning a good living and we feel that by promoting an interest in proper dental hygiene, we are doing a service for their future lives, whether they are with our establishment or elsewhere.

After 18 months as an osteopathic physician engaged in the care and prevention of disease among an industrial army of about 1,500 people, I feel privileged to speak with certainty when I say that here is an excellent field for osteopathy. I am certain that as the years go on we will see osteopathy being accepted in many industrial plants throughout the country, on the basis not only of symptomatic treatment, but also of preventive medicine.

References

JOHNSTONE, R. T.: Occupational diseases; diagnosis medicolegal aspects and treatment. W. B. Saunders Co., Philadelphia, 1941.

GAFAFER, W. M., editor: U. S. Public Health Service Official Manual of industrial hygiene. W. B. Saunders Co., Philadelphia, 1941.

NEWS, COMMENT and OPINION

—*Continued from page 50.*

is materially decreased. Sander also states that welding and siderosis do not predispose to tuberculosis or to other lung infections, nor do they cause functional impairment of the lungs or symptoms referable to the lungs. Acute irritations of the throat, however, may occur with too prolonged work in dense clouds of fumes, but these appear to be transitory and to leave no residual. He believes that any respiratory involvement may be prevented in welding, even with the most prolonged and confined work, if proper precautions are taken by installing adequate exhaust ventilation and by using ventilated helmets or positive-pressure respirators. Another study, carried out by physicians of the Permanente Foundation Hospital among the workers of the Kaiser Richmond Shipyards on the West Coast, suggests that acute pulmonary infections are neither more frequent nor more serious among shipbuilders than among similar persons in other walks of life. This study covered a 12-month period during which 864 patients with pneumonia were treated. Some of the findings and the conclusions based on this study are worth mentioning. The annual frequency rate of pneumonia at the shipyards was 9.5 per 1000 workers. This is probably a high incidence, but, as the authors point out, there are no reliable data to indicate that it is any different in shipyard workers from among the general population. It certainly is lower than the rate among certain types of workers in the iron and steel industries, but it is higher than the average incidence reported for all iron and steel workers. The type of pneumonia among the shipyard workers was in no way different from that among the general population. There was no indication that workers who had recently migrated to the region of the shipyards from other states were more susceptible to pneumonia than those who had lived in that region for a long time. The incidence rate for pneumonia was independent of the length of employment at the yards, as well as of the type of work done by the workers. In particular, pneumonia was no more frequent among welders than among those doing other jobs, such as laborers, electricians and machinists. The gross mortality for the entire group of patients with pneumonia was 8.2%. This figure, as the authors point out, compares favorably with that achieved in many of the best clinics throughout the country. A large proportion of the patients were over 40 years of age and had more than one lobe involved. The mortality in patients under 40 years of age was less than 4%, and in those having only a single lobe involved it was less than 5%. These low fatality rates suggest that the conditions to which the shipyard workers were exposed did not aggravate the prognosis in those who acquired pneumonia. More likely,

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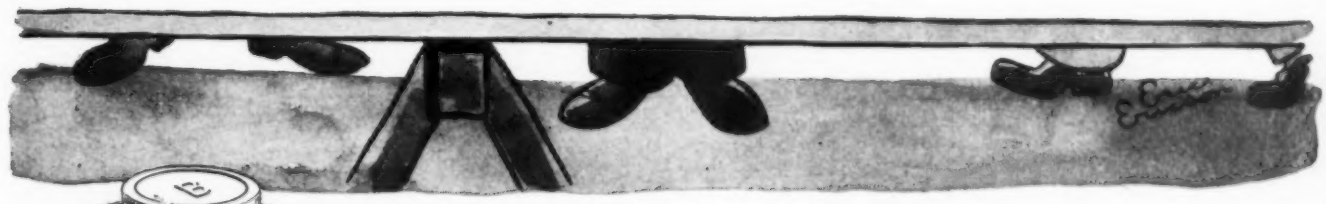

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however, it reflects the fine type of medical care that these patients received. Apparently the United States Maritime Commission has been deeply concerned about the widespread rumors among workers and physicians that welding causes respiratory disease. The commission is, therefore, anxious to give the findings among the Kaiser shipyard workers widespread publicity in order not to discourage people interested in this form of employment.

—Editorial, *New England J. Med.*, September 21, 1944.

Standards

ON SEPTEMBER 30, 1944, the Committee on Allowable Concentrations of Toxic Dusts and Gases, of the American Standards Association, met in New York City. Eighteen representatives of industrial hygiene agencies attended. The Subcommittee on Fluorine and Fluorides and Hydrofluoric Acid reported that it is now prepared to write a report using a suggested maximum allowable concentration of 6 p.p.m. expressed as hydrofluoric acid for an eight-hour six-day week continuous exposure. The subcommittee is also prepared to include in its report a physiological standard based on the amount of fluorine excreted in the urine. The maximum allowable excretion concentration will be 10 milligrams per liter. The committee approved the report of the Subcommittee on Methyl Chloride recommending the writing of a standard using 100 p.p.m. as a suggested threshold limit. The Subcommittee on Radium, Radon Gas, and Gamma Ray Exposure reported that it will have a draft for consideration in the next two months. It was decided to recommend the appointment of a subcommittee to prepare standards for sulfur dioxide, cyclohexanes, industrial x-ray exposures, and certain fungicides. The committee voted to invite the NATIONAL CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS to appoint a representative to serve on the Committee.

—*Industrial Hygiene News Letter*, October, 1944.

OD Wall-Chart

THE Pioneer Rubber Company, Willard, Ohio, has prepared a "Reference Wall-Chart of Occupational Diseases of the Skin." "Stigmata, injuries, ulcerations, inflammation and proliferations of the skin caused by contact with substances encountered at work are all listed by LOUIS SCHWARTZ, M.D., of the U. S. Public Health Service," and each type of employment, and its principal dermatologic hazards, together with the suggested protective measures in each instance, have been tabulated in convenient and easily readable form. The reference is to "Occupational Diseases of the Skin" by DR. SCHWARTZ, in Wampler's Principles and Practice of Industrial Medicine (Williams & Willkins Co., Baltimore).

Pre-employment Hazard

AS MEDICAL director of a munitions plant, I had been making a pre-employment examination of a job applicant. Completing the check-up, I told the man to dress and come to my office. I then walked out of the examining room, through the reception room, and into my consultation room. I had hardly reached my desk when I heard a shriek from the nurse. Hurrying back into the reception room, I discovered the applicant I had just examined sprawled on the floor, stark naked! Without thinking—and without first dressing—he had started to follow me to my office, then found himself in the crowded reception room. In his mad rush to retrace his steps, he had fallen headlong over a chair. Somehow, as my waiting patients looked on, enthralled, he got back to where his clothes were, hurried into them—and ducked out a back door. I have never seen him since.

—A. BAIER, M.D., in *Medical Economics*, October, 1944.

Industrial Practice in Minnesota

AS A RESULT of the rapid growth of industrial practice in the state, a considerable number of physicians are now engaged in contract practice in Minnesota. In view of the fact that industrial medicine is playing an important part in the war production effort and will undoubtedly play an important part in our industrial development after the war, it is encouraging to the committee that no serious infractions have been reported of the code of ethics adopted some years ago at the recommendation of this committee. Good plant practice is now generally understood to consist mainly of pre-employment examinations with periodic check-ups, emergency treatment and supervision of health conditions in the plant. The development and expansion of such practice should be encouraged.

—F. A. OLSON, M.D., Chairman, Committee on Industrial and Contract Practice, in *Minnesota Med.*, October, 1944.

Industrial Hygiene Foundation

—Ninth Annual Meeting—

Pittsburgh

Wednesday, November 15, 9:30 A.M.

THE Foundation in War and Postwar—ANDREW FLETCHER, Vice-President, St. Joseph Lead Company, Chairman, Foundation's Board of Trustees; JOHN F. MCMAHON, Managing Director.

Keynote Address—H. E. BATCHELLER, President, Allegheny Ludlum Steel Corporation, Chief of Operations, War Production Board.

"Putting the Disabled Veteran Back to Work, II"—A continuation of the panel discussion pioneered at the Foundation's 1943 meeting, presenting experience in successful job-placement of discharged veterans; a 1944 progress report on actual cases in representative companies.—Presiding: C. D. SELBY, M.D., Medical Consultant, General Motors Corporation, Member, Foundation's Board of Trustees and Medical Committee; COL. JOHN N. ANDREWS, Officer in Charge of Postwar Activities, National Selective Service System; HARLEY L. KRIEGER, M.D., Medical Director, Ford Motor Company; A. A. HENDRIX, Personnel Director, Eastern Aircraft Division, General Motors Corporation; I. DENT JENKINS, Personnel Manager, Harrison Radiator Division, General Motors Corporation; B. F. STREETS, M.D., Medical Department, Westinghouse Electric & Manufacturing Company.

Wednesday Afternoon

MEDICAL and Engineering Sections—Presiding: COL. A. J. LANZA, M.C., Director, Occupational Health Division, Army Service Forces, Member, Foundation's Board of Trustees and Chairman, Medical Committee; PHILIP DRINKER, Harvard School of Public Health, Member, Foundation's Board of Trustees and Chairman, Preventive Engineering Committee.

"Recent Developments in Pre-Placement Physical Examinations"—C. M. PETERSON, M.D., Secretary, Council on Industrial Health, American Medical Association.

"Protection of Workers Against Noise"—HALLOWELL DAVIS, M.D., Assistant Professor of Mental Health, University of Michigan.

"Effectiveness of Tall Stacks in Minimizing Objectionable Emanations from Industrial Plants"—GEORGE R. HILL, PH.D., Director, Department of Agricultural Research, American Smelting and Refining Company.

"Upper Limits of Tolerance to Heat and Humidity"—LT. COL. T. F. HATCH, S.C., Armored Medical Research Laboratory.

"Findings from Foundation Surveys of War Plants"—F. R. HOLDEN, PH.D., and W. C. L. HEMEON, M.S., Industrial Hygiene Foundation.

Thursday, November 16, 9:30 A.M.

LEGAL Section—Presiding: THEODORE C. WATERS, Mullikin, Stockbridge and Waters, Member, Foundation's Board of Trustees and Chairman, Legal Committee.

"Medical Aspects of Compensation for Partial Disability from Silicosis"—GEORGE WRIGHT, M.D., Saranac Laboratory.

"Legal Aspects of Compensation for Partial Disability from Silicosis"—THEODORE C. WATERS.

"Second Injury Funds as Employment Aids to the Handicapped"—MARSHALL DAWSON, Division of Labor Standards, U. S. Department of Labor.

"Legal Developments in 1944 Respecting Industrial Health"—VANDIVER BROWN, General Counsel, Johns-Manville Corporation, Member, Foundations' Board of Trustees and Legal Committee.

MANAGEMENT Section: "Sickness Indemnification"—A frank panel consideration of a subject, popularly called health insurance, which is of increasing concern to management. —Presiding: R. A. HOHAUS, Associate Actuary, Metropolitan Life Insurance Company.

(a) "The Economic Basis of Health"—A definition of the problem and an outline of requisites of sound health in terms of medical care in connection with sickness.—ANDREW COURT, Labor Economics Section, General Motors Corporation.

(b) "Sickness Indemnification"—Advantages and disadvantages of sickness indemnification based upon studies of sick absenteeism and sick benefit plans in operation among Foundation member companies.—W. M. GAFAFER, D.Sc., Principal Statistician, U. S. Public Health Service.

Thursday Afternoon

MANAGEMENT Section (Continued): (c) "Medical Expense Indemnification"—Advantages and disadvantages of medical expense indemnification plans, including results of case studies in United States and Canada.— N. SINAI, DR.P.H., Professor of Public Health, University of Michigan.

(d) Open Discussion

(e) Summary and Conclusions—R. A. HOHAUS.

"Increasing Importance of Industrial Health in Industrial Relations"—V. P. AHEARN, Executive Secretary, National Industrial Sand Association, Industry Member, National War Labor Board.

Business Meeting of Members.

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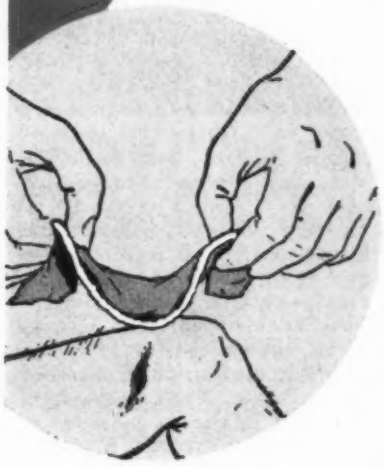

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INDUSTRIAL HEALTH and DISEASE

Occupational Illnesses in the Cotton Industries

—I. Cotton Fever—

WAYNE L. RITTER, M.D.,
MORRIS A. NUSSBAUM,
Jackson, Mississippi

BY FAR the most common occupational disease in Mississippi is one that has received almost no notice from our physicians. Superintendents and foremen in cotton seed oil, textile mills and gins all know about it in varying degrees. They refer to it as "cotton fever," "dust chills," "card room fever," or "cotton cold."

Our attention was focused on this condition through an article by Neal, Schneiter, and Caminita.[1] They described an acute illness that had occurred among employees in government mattress-making projects. This illness was attributed to an endotoxin liberated by bacteria found *within* cotton fibers. These bacteria were identified as *Aerobacter cloacae*. The clinical condition described by them seemed identical to our own "cotton fever" or "dust chills." We, therefore, sent samples of cotton linters and dust from the rafters of cotton seed mills, card rooms and gins to their laboratory for identification. Our samples were reported as containing organisms identical to the various strains that had produced the illness they had described. Therefore, it seemed timely for us to make further studies of some of the health problems that characterize our cotton industry.

As a beginning, visits were made to 37 cotton seed oil mills. All but two of the superintendents of these mills admitted some knowledge of "cotton fever" or " dust chills" among their employees. In the mills where the superintendents seemed unacquainted with this condition, their negroes in the linter rooms were well aware of it. The natural history of the disease will be reported as a summary of all these interviews.

It is conceded by everyone that a period varying from three to 30 days is required for new employees to become adjusted to working in cotton dust. Most superintendents believe that this adjustment period is due to something peculiar about cotton dust itself.*

Among new employees working in cotton dust about 10 to 50% develop a definite chill. The onset of this condition may take place during work on the first day but it more frequently develops after the employee returns from work to his home in the evening. This chill is followed by a fever (100° F—103° F) that is almost invariably gone by morning. A headache usually accompanies the fever. Occasionally there is a nose bleed or nausea, even vomiting. This identical experience may be repeated for the first several nights. Such repetition of a "dust chill" is fortunately quite uncommon. For the next few nights this new employee usually has only a slight recurrence of the fever and a vast sensation of exhaustion.

Usually by the end of the first week, but almost certainly by the end of the first month of employment, these symptoms no longer develop in the individual so long as he continues in the same job. If during the first year of employment this individual should be away from work for about two weeks he will probably have this immunizing experience to go through with all over again—this second bout of cotton fever is usually much milder—seldom any chill or nausea, and temperature usually less than 100° F. Because of the mildness of the symptoms this recurrence is frequently overlooked. Older employees who may have spent many years at this type of work usually have to be away from the dust for a month or two before they need anticipate a recurrence.

The cotton seed crop is of course collected in the fall and by late spring or summer cotton seed mills have completely processed their supply. Because of this many superintendents and their men have to go through this cotton fever every fall having lost their immunity during the summer.

There was a wide variation in the superintendent's estimate of the percentage of his men that developed a chill. It was found on analyzing our answers that in the mills where the superintendent himself had chills, the highest incidence was also reported among the men. This was probably motivated by the fact that a superintendent who developed the condition himself would be much more prone to have a close and sympathetic understanding of similar problems among his men. In one of the most modern and best maintained mills in the state, the superintendent told us that half of his men in linter rooms and seed houses got dust chills at least once a year. In a very poorly maintained mill where the superintendent had had no dust chills, he estimated the incidence at only 2 to 5%.

Cotton seed is usually bought from gins in carload lots. Unloading these cars is a dusty business—so much so that a man working in this environment soon becomes completely covered with about ¼-inch coating of cotton linters that gives him an appearance of being mildewed. The concentration of cotton dust in such a job may be sufficiently greater than the dust concentration to which the individual has become adjusted that being transferred to such work may produce a "dust chill." This observation has been made by almost all the superintendents and has given rise to the belief that a worker only gets accustomed to that concentration of dust to be found in his usual working environment.

Occasionally seed may sour or be of extremely poor quality. The processing of such seed may also give rise to severe dust chills, sometimes with nausea and vomiting.

[1] See also *The Mississippi Doctor*, September, 1944.

*When oil has been pressed out of cotton seeds, the residue is sometimes ground into a fine meal. Although there may be more dust in the air from this operation than is usually present in a linter room or seed storage house, employees who work only in the dust from meal almost never require an adjustment period or get cotton fever.

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Shearing the linters from the cotton seed formerly gave rise to a great deal of dust. Linters are now almost invariably collected by local exhaust ventilating systems. Since the installation of these "flue systems" into the mills all the superintendents have noted a reduction in the incidence of "dust chills." It is admitted, however, that it still takes time for new employees to get used to the work.

In an effort to get a clearer idea of some of the clinical features of this occupational disease, one of us (WLR) spent a day unloading seed from a storage house onto a conveyor belt. By afternoon of the working day a slight degree of chest pain was noted when a deep breath was taken. The inhalation of a cigarette was so invariably associated with attacks of coughing that this regular diversion was entirely discontinued for the remainder of the day.

Although dust chills may occur among new employees after a few hours of work, by the end of the day there had been no chill. Only extreme fatigue was noted but this was attributed to the unusual labor which was considerably more violent than a normal occupation for the author. The work brought no appetite; only a sandwich and part of a glass of milk were taken during the course of the evening. There was, however, no vomiting; nausea should be rated as mild.

By 6:30 P.M. temperature was 99.2 F. This rose to 100.2 at 9:30. By 11:30 P.M. just before falling asleep, temperature was back to 99.6. The following morning there was no fever at all, nor any subsequent recurrence of it.

Also on the following morning a white blood count showed 11,750 cell per cu.m.m.—84% of these were polymorphonuclears. There were no eosinophils nor peculiarities of the blood cells that might have been suggestive or helpful in differentiating this condition from others. Indeed all symptoms were so mild that had there been no conscious curiosity to guide the collection of clinical data this "cotton fever" might have been overlooked or its existence even denied.

Discussion

WE HAVE been unable to find anything suggestive of cotton fever among those who pick cotton in the fields. It would seem reasonable to suppose that such a condition would be rare under these circumstances since there is a very limited amount of tearing of the cotton fibers. There is, therefore, only a small amount of dust created and space is not confined to allow for its concentration.

This observation also holds true for cotton compresses and warehouses. There is comparatively little dust in these businesses. (Although one compress foreman who had spent some time in cotton seed oil mills told us that he occasionally found a new man who got cotton fever "just like the oil mills have."

The textile mills know this condition as a "cotton cold" or ' card room tion as a 'cotton cold" or "card room fever." It is an almost universal experience among new employees in the carding and picking operations. Although an occasional worker may have a chill in the beginning, chills are extremely uncommon in card rooms.

There is a real question in our minds whether the condition in our card rooms is identical to that reported so extensively by the English. We were unable to get any indication that would suggest that any symptoms of new or old employees were more marked on Monday than on any other day. This would seem to be one of the most characteristic and identifying features of the English condition.

On the contrary, in our card rooms the illness starts with a slight fever together with symptoms of an infection of the nasal sinuses. Hence the name "cotton cold." An occasional case may have a nose bleed. A cough develops. If the cough is sufficiently severe, it may lead to vomiting (as children do with whooping cough). Nausea is infrequent. This process lasts from two to six weeks.

Apparently because work of this type in textile mills is not seasonal,

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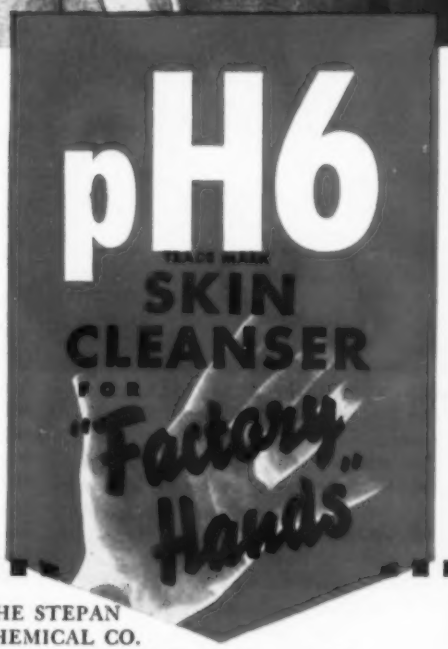

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recurrences of cotton colds are not common. This condition is seldom found among spinners, weavers or in card rooms where dyed cotton is used exclusively.

We have been unable to find any card room workers who admit having a persistent cough or shortness of breath. This in itself has seemed worthy of note since in our previous investigations more workers have been found with complaints referrable to the subject under inquiry than we have been able to find any justification for.

The more severe form of cotton fever starting off with a chill is frequently found in mattress factories and industries where cotton linters are used in the upholstering of furniture.

The management of every cotton industry that has been contacted has expressed a belief that "there are some people who can't take this kind of work." An inquiry into this belief by a detailed investigation of a number of such cases is the basis for work to be published later. Probably because labor has been both cheap and plentiful in the cotton business in the past, little effort has been made to get any detailed understanding of many of the employee health problems encountered.

A big factor in labor turnover is the belief of many workers that permanent employment in an atmosphere of cotton dust is bound to result in early death. Many workers bring statements from their physicians requesting a transfer to some other kind of job. It seems to us that a clear and simple explanation of cotton fever or cotton colds given to the employees before they start to work would be extremely helpful. They are bound to find out about it anyway. Discussions of this condition are inescapable among employees—like sex in schools. Industrial management should assume the initiative in these discussions. Their worker would then be more disposed to accept management's appraisal of any subsequent health hazards as being complete and unbiased.

The whole issue of acute occupational illness among those employed in the cotton industry has been confused by the many names given to this condition. Four descriptive names have been used in this report—there are a number of others (Monday fever, heckling fever, etc.) found in European medical reports. The very fact that so many names are in common usage testifies to the almost universal experience of this illness in the cotton business. The names may differ, but not the fact of acute illness.

Conclusions

COTTON fever is an occupational disease common to almost every new employee working with untreated cotton in an enclosed space.

2. The severity of the symptoms depends upon the quality of the cotton and the concentration of dust from it.

3. Immunity is usually developed by a worker for a given working environment.

4. Subsequent attacks may occur (a) on protracted absence from a given job, or (b) on being shifted to dustier work, or (c) on being exposed to much lower grades of cotton.

Reference

1. NEAL, P. A.; SCHNEITER, R.; CAMINITA, B. H., *J.A.M.A.*, 119: 1074-1082, 1942.

Re-employment of War Veterans

J. J. WITTMER, M.D.,
Personnel and Medical Director,
Consolidated Edison Systems,
New York

I HAVE been asked to speak on the *problem* of veteran re-employment. I am afraid that there are some who are thinking of this situation *as a problem*, a problem with such a myriad of variables and uncertainties that we are waiting for some super mathematician to come along and solve it for us. Some of us may be wasting time wondering what the government has in mind, what government edicts or fiats will be issued, what present laws mean, how they can be interpreted, and, in some very few instances, what loopholes can be found that will allow us to evade our obligations.

May I state most emphatically that if we approach the situation with this attitude of evasion or waiting for governmental guidance, we are sticking our necks out, inviting more government agency control than ever, more directives, and even a whole host of new laws. Re-employment of the veteran can and should be approached with enthusiasm and whole-hearted good will. These boys who entered military service to save our skins are entitled to a real job when they return —not because of any governmental edict but because we, as appreciative citizens and fair-minded executives should be only too glad to help put them back on their feet again as useful, constructive members of society. We must realize that these are the young men who must carry on our business when we pass on—the men who must develop the brains and the skills that are necessary to keep the wheels going when we old men are retired or are arguing with St. Peter. Our thoughts should not be do we have to take these fellows back, but rather "By gosh, we are glad to have them back—now where can they be most effectively?"

Again, too many of us are thinking in terms of postwar veteran reemployment, something that is going to happen months or even years from now. All of us must realize that the veteran is returning to us now, today and tomorrow. It has been and will be a continuing proposition. There isn't going to be a line of demarcation between "this is war" and "this is postwar." In a great many concerns as many as 20% of their veterans have already returned, and such returns will continue at an ever-increasing rate. Army spokesmen have stated that more veterans of this war have already been mustered out of service to date than were inducted in the first World War, and that by the end of the war a total of at least 18,000,000 men. will have been returned to private life. Todad is the day that we should plan to be ready adequately to take care of the veteran. Just keep in mind that on November 1, 1918, 10 days before the armistice of World War I was signed, official pressure was brought on a committee headed by Mr. Bernard Baruch to exclude postwar planning for the veteran because it might interfere with the war effort. We are all familiar with the shameful results of that point of view. There is a definite problem (if we want to call it such) as to how we are going to orient the returned veteran. However, this problem can be serious only if we fail to face it squarely, without delay, and to make plans to overcome it. It can be solved if we approach it in an orderly, rational way, just as we would handle any other business problem that confronts us. I feel that some "honest to God" thinking and effort while there is still time, with the object of placing each veteran, according to his qualifications or limitations, in a job that he can do efficiently and happily, will enable all of us to lick the problem and at the same time make each returned veteran an asset to the business.

A GREAT deal of the worrying along these lines has dealt with the disabled veteran. It is quite possible that all veterans can be classed as disabled to some extent—disabled from the standpoint that they must adjust themselves to an environment far different from that which they have encountered for the past several years. This sort of disability, even in the non-physically disabled, can become very serious if not properly handled. What is going to happen to the bright young office boy of three years ago who has gone through officers' training camp, been commissioned, led his men through all kinds of strife, rigors, turmoil and successes and returned to you with the rank of captain. Can you return him to an office boy's job, and will he become adjusted to such a situation? Or will you make

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him a vice-president? Does the ability to lead men into battle and in the business of killing make him capable of performing a much higher type of work in your business? This kind of a case needs a lot of thought. Of course, the young engineer who has taken further courses in engineering and has had an unusual and extensive experience in military engineering problems, is a much easier case to solve than the office boy captain.

I BELIEVE that the most important link in this chain is the supervisor. It is the supervisor who must be willing so to adjust and rearrange his force that these physically handicapped veterans can be properly placed. Sometimes it is difficult, and takes quite a bit of thinking and planning to work out the various necessary checker-board moves. The supervisor should be wholeheartedly and enthusiastically willing to expend this energy and time. In addition, he is the one who is working with the employee all day and, therefore, he must have understanding, sympathy, tact and a realization that adjustments come slowly. After a person has spent several years living, breathing and working entirely outdoors, it will take more than a few hours to become adjusted to total indoor work. As changes occur, either for better or for worse, in the veteran's physical condition or mental status, or he shows that he is capable of a higher grade job or a lower grade job, the supervisor should consider it his duty to bring this to the attention of those in charge. I cannot emphasize too strongly that supervisors, and I include all degrees of supervisors, play the most important role in veteran adjustment.

It would be worthwhile to get all the supervisors together, have a frank discussion of the whole situation, make them aware of the various difficulties of veteran re-employment, and definitely inform them of your plans and desires in this matter.

One thing which can be done immediately is to set up a chart with all classifications of jobs, alongside of each classification the basic physical requirements — particularly the defects that can be present and still allow the man to do that job. As an example, what particular jobs can be properly performed with only one arm? What machine jobs without acute hearing? What bench jobs that do not require two legs, etc., etc.? Coded physical requirements graphed against the job classification make a very simple chart which can be readily applied.

Quite commonly, when the first veteran who was a key man before going into service appears for re-employment, we put him into the best job that is open at the time. Sometime later the second veteran appears and we suddenly realize that the job which the first man now has should have been held for the second man, in that the last man is much better fitted for the job. In other words, your plans should be such that key jobs not only should be listed, but there should also be a tentative pegging of these jobs for each man in the service. This entails, of course, corresponding with each veteran, and keeping up-to-date as to his experience in service, his future plans and his desires. But in this way, round pegs will not be fitted into square holes just because the round peg was demobolized before the square one.

A coherent practical working committee should consist of the industrial relations director, the medical director, the educational director and the operating manager. These men should first become thoroughly acquainted with problems that will be presented, have the means to set up to take care of these problems, and then see that they are made to work.

In small plants, conceivably, it is not possible to have a medical director or an educational director. Certainly these plants can afford someone who is able to handle personnel work. In these instances the personnel man must take on the cloak of an educational director and at least the vest of a medical director. The personnel man can be educated to ascertain the signs and symptoms of disability in a gross way. In fact, his line of questioning may be able to elicit the basic causes of psychoneurosis as well as, if not better, than the doctor. He can give much more time to this endeavor than the doctor and, in these cases,

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time is of the essence. There are plans developing now where some medical schools will set up special courses for laymen—to enable them at least grossly to ascertain the mental abilities and aptitudes of the veteran and more intelligently to fit him into the job, saving those cases that are beyond their elemental knowledge for the doctor or psychiatrist.

Again let me state that the reinstatement and employment of the returning veteran is a serious problem only if we want to make it so. Accept the basic concept that these men are needed to fulfill the future requirements of your business. Then the "problem of the returning veteran" loses its abstraction, and resolves itself into merely an expansion of the ordinary process of handling, in an orderly and practical way, the adjustment of available manpower to the requirements of competitive business.

War Seminar

—Proceedings of the Third War Seminar Sponsored by the American Mutual Liability Insurance Company, Boston, held at Chicago, July 12-13, 1944—

Reported by

C. O. SAPPINGTON, M.D., Dr.P.H.

Wednesday, July 12

INFORMAL reception and dinner, Stevens Hotel. Welcome by G. L. MARSTON, Vice-President and Manager, Claim Department.

Round Table Discussion—A Report of The End Results of 92 Operations for Intervertebral Discs—Speakers: DR. HENRY C. MARBLE, presiding; DR. ERIC OLDBERG; DR. PAUL B. MAGNUSON; DR. WILLIAM A. BISHOP.

Thursday, July 13—Morning Session

A. D. BRITTON, Director of Medical Relations, presiding.

"Treatment of Burns" (Lessons learned from Cocoanut Grove Disaster)—Speakers: DR. CHARLES LUND; DR. FRANCIS H. L. TAYLOR; DR. STANLEY M. LEVENSON.

"Penicillin Therapy"—DR. WALTER S. PRIEST.

"The Doctor's Part in the Job Placement of Disabled Veterans"—Speakers: DR. W. A. BISHOP—Medical Aspect; DR. R. H. KENNEDY, COL. U.S.A.—Surgical Aspect; DR. L. J. POLLOCK—Neuropsychiatric Aspect; MR. A. H. JOHNSON—Safety Engineering Aspect.

Thursday, July 13—Afternoon Session

H. L. LOCKWOOD, Western Division Claim Manager, presiding.

"The Wedge-Shaped Vertebra"—DR. HOLLIS E. POTTER.

"Health Hazards of Electric Welding"—DR. O. A. SANDER.

"X-Ray Aspects"—DR. PAUL G. DICK.

"Shock and Blood and Plasma Therapy"—DR. D. B. PHEMISTER.

THE Third War Seminar on Industrial Medicine and Surgery, sponsored by the American Mutual Liability Insurance Company of Boston, presented a variety of material of interest to industrial physicians and surgeons.

The first of the pre-war seminars of the American Mutual was held at Boston in the spring of 1939; the second in Philadelphia in the spring of 1940; the third in the fall of the same year at Chicago; Atlanta was the scene of the fourth in the spring of 1941; and the fifth was conducted at Albany, New York, in the fall of 1941. Leaders in the field of industrial medicine and surgery have addressed these meetings and talked about special subjects, giving physicians engaged in industrial medicine (including the staff doctors of the company) the latest and most up-to-date scientific information on important phases of industrial work; and developing and fostering a spirit of cooperation and understanding between physicians and the company.

Wednesday, July 12

DRS. HENRY C. MARBLE and WILLIAM A. BISHOP, in discussing "The End Results of 92 Operations for Intervertebral Discs," presented an analysis of cases from the literature, using lantern slides and blackboard figures in demonstrating the statistics.

In Mixter's 184 cases which were operated, 51.1% showed 95 to 100% relieved. Other figures were as follows:

Fused	Unfused	
53.2	52.5	22.3% showed 85 to 95% relieved
19.5	41.5	16.9% showed 70 to 85% relieved
15.6	4.4	8.7% showed failures
		1.6% died after operation
		5.4% were not traced

Still other figures showed that 80% were well in one to six months; 10% were well in six to 12 months; and 9% were well in one to two years.

Figures from the Lahey Clinic showed the following:

38% could do anything. 60% could do no heavy lifting.
2% could do no work on account of pain.
20% had low back pain.
40% had occasional pain when tired.
40% had no pain.

In a series of 496 cases, in which 92 operations were done (in the figures presented by DR. MARBLE), 34 had excellent results, nine had fair results, and 49 had poor results. (*Excellent* means that the patient was able to go back to work in six months; *fair* means that return to work was possible in one year; and *poor* means that return to work was possible in a period of over one year.) In this series, those who had fusion operations showed four with excellent results, one with fair result, and 23 with poor results, and the average age respectively in these groups was 36, 42 and 39. In checking a series of 90 cases, 17 of which had operations and of which four were fusion operations, eight showed excellent results, one fair result, and there were eight with poor results.

Lantern slides were used to show a cost analysis on a nation-wide basis, the average cost being $471 for the excellent result group; $714 for the fair result group, and $1470 for the poor result group, the compensation costs alone being respectively in these groups: $276, $602 and $3071.

Another set of figures showed that diagnoses were made in 73 cases by neuro-surgeons; 54 by orthopedists; 28 by lipiodol; 37 by air; and 26 showed atrophy.

Case histories were presented, on lantern slides, of 17 cases in western experience, the presentation being very rapid to save time. It was stated that the results in this series did not coincide with published results.

DR. ERIC OLDBERG, in discussing the presentation, stated that it would be desirable to lay down rules and help medical and claims men. It was observed that expensive and long-drawn-out cases were those which had been fused—where a complicated operation had been superimposed upon a simple one.

It is felt that a disc operation is a special procedure and is done not without considerable difficulty. In an experience of nearly 100 cases, the following points seem important:

1. These cases were almost all males; females do better on conservative therapy.

2. Age makes considerable difference in the outcome because of the character of the bone and the disc changes; it is best to be wary of doing an operation at the age of 50 and over, although there are some exceptions.

3. If the diagnosis is definite, it is well to put the patient on conservative treatment (using a stiff board under the mattress and avoiding heavy lifting). If the patient improves, he should be let alone, but, if improvement is not definite, eventually it is well to avoid neurosis by operation.

4. Operative procedures are variable: opening and removal, laminectomy, fusion, and others. When in much doubt, it is best to do nothing, and when in doubt, be conservative. Incision exposure should be adequate. Since we are not as well informed on end results as we might be, it is wise to remove such structures as are loose, doing a simple hemilaminectomy at the fourth lumbar level, and do as little else as possible.

Lipiodol should be removed if possible, but we should be able to diagnose a herniated disc without this procedure. Cases have been observed which were normal on x-ray in which there was a protrusion of the disc, and also no disc protrusion has been observed in cases which were normal on x-ray. In cases which have been delayed for a considerable length of time, entire removal may produce irritation.

There should be no primary mortality—such as there is, is probably due to other causes.

In conclusion, we do not know enough about end results

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In addition, John and Mary and the other people on the Payroll Plan have been among the biggest buyers of *extra* Bonds in every War Loan Drive.

When you come to figure out the total job that John and Mary have done, it's a little staggering.

They've made the Payroll Savings Plan the backbone of the whole War Bond-selling program.

They've helped keep prices down and lick inflation.

They've financed a good share of our war effort all by themselves, and they've tucked away billions of dollars in savings that are going to come in mighty handy for both them and their country later on.

When this war is finally won, and we start giving credit where credit is due, don't forget John and Mary. After the fighting men, they deserve a place right at the top of the list. They've earned it.

You've backed the attack—now speed the Victory!

to say that fusion will prevent the narrowing of the intervertebral space.

DR. PAUL B. MAGNUSON, in continuing the discussion, agreed substantially with DR. OLDBERG. Present status of this subject has occurred between the years 1939 and 1944 when workers desired to work for high wages.

With respect to sciatic pain, a great deal has been said and less has been known.

It has been thought that the tissues of the back are subjected to the same disability and diseases as similar tissues elsewhere. However, small joints bear a great deal of weight in the joints of the back with the fulcrum at the fifth lumbar vertebra which sits on a slope—hence troubles occur much easier than in larger joints.

It is a mistake to operate without grave consideration of actual need.

The whole subject is a problem in psychology which has been passed around a great deal and, for this reason, we see no early cases any more.

Compensation cases do not recover as well as others; therefore, one should hesitate to do a fusion or disc operation on the former type of case. If one has to go to great pains to curette material out during the operation, the diagnosis is possibly negative.

The nucleus lies in the posterior two-thirds of the vertebral segment, and the long ligament and plexus of vessels lie laterally; in the latter location is where the protrusion takes place.

To say that the structure of the lumbosacral region is "normal" is like saying that a face is normal. An example was given of a man of 84 who had done no hard physical work during his life, but had a spondylolithesis with 50% slip; however, he had no backache.

Any swelling around the capsule laterally can be transmitted to the nerve. The sizes of foramina vary greatly—the average is 7 mm. and the average diameter of the nerve is 6 mm. In experimental work, simple injection of the capsule can increase the size of the capsule 2 mm.; with inflammation one can observe as much increase as this or more. Pathological specimens in experimental work and also in autopsy show branching of the nerves by splitting—here pressure or swelling can cause impingement.

It should be remembered that degeneration of the joint capsule and other structures, such as ligaments and similar ones, is more common than supposed. We should be able to trace the nerve effects in such cases.

Finally, one needs to consider carefully all of the factors concerned.

COL. R. H. KENNEDY stated that criteria had been set up at the Army hospital at Battle Creek, Michigan, and gave army experience, with figures which were not for publication, also expressing opinions which were purely personal.

Further discussion brought out a number of interesting points: traction is of great assistance if too much is not used—about 8 lbs. is as much as can be tolerated. A board under the sleeping mattress is of help many times, permitting the body to rest without sagging, which takes off a great deal of strain. Casts very often do not permit enough change of position. Simple means should be used first; traction works as a form of rest in some instances, giving the ligaments a chance to get well.

Back patients should be examined like others. Pain may not be due to injury; one should consider infections, toxemia, allergy, and the general picture of the patient's life—including diet, blood chemistry, age, general wear and tear. Physicians were warned not to develop a phobia on backs. Rest and traction properly and promptly applied will do a great deal to help.

Thursday, July 13

THE order of the program was changed here, the next presentation being "The Doctor's Part in Job Placement of Disabled Veterans."

DR. W. A. BISHOP began the symposium, discussing the medical aspects of the subject, giving a review of the reaction to the workmen's compensation laws, and leading up to the present situation of the difficult problems with reference to the job placement of disabled veterans.

A special plea was made for the medically crippled. These can best be served by permitting them to be self-sustaining. Properly placed and supervised, the crippled individual can do just as good work and as valuable work as his brother who is whole; contrary to previous views, the crippled need not be a liability to himself, his fellow worker, or his employer.

The problem has two phases: (1) to provide employment and (2) properly to place the applicant.

The first can be left to the industrialist, business man and economist, hoping that they can accomplish it with the minimum of governmental intervention, except in the exercise of their proper function of providing equal opportunity, the abolishment of improper practices, and the assurance of a square deal for everyone.

The second half of the problem requires the participation and cooperation of three agencies: (1) the industrial physician; (2) the job analyst; and (3) the placement officer.

The functions of the job analyst and placement officer can, if desired, be combined in one individual chosen from the plant managerial staff. (Simple forms have been provided by the company for job analysis, listing physical factors and physical demands, and the physician's report containing the physical capacities analysis.)

With the information provided on these forms, the placement officer is ready to fit the applicant to a job: (1) where his work or the environment will not aggravate or increase his impairment; (2) where his physical or mental condition will not prevent efficient work at the assigned tasks; and (3) where his condition will not increase the hazard to himself, his fellow worker or the property of his employer.

Confidential information may be obtained in the preplacement examination, which, remaining in the hands of the physician, will constitute a valuable basis for future guidance. Periodic examinations will serve to confirm initial judgment—together with the new examination and interview, dangerous trends may be indicated and the need for revision of the original plan.

The procedures are not different from those with the private patient, in the office, home or hospital; the difference lies in the prescription which is to be filled by the placement officer; it will indicate the employee's ability to work and will deal with the activities in which he should not be engaged, as well as the environments to which he should not be subjected.

The physical defects which the plant physician may encounter can be grouped mainly under the following headings: (1) medical; (2) surgical; (3) orthopedic; (4) neuropsychiatric; (5) ophthalmic; (6) aural; and (7) dermatological. The majority of the medical defects observed will fall into the following categories: (1) cardiovascular; (2) respiratory; (3) gastro-intestinal; and (4) diseases of metabolism and nutrition.

Consideration was given in detail to some examples of the above categories.

COL. R. H. KENNEDY, in discussing the surgical aspects, gave an impromptu presentation which was entirely censored.

DR. L. J. POLLOCK, who was to discuss the neuro-psychiatric aspects of this subject, was not present.

MR. A. H. JOHNSON closed the symposium, discussing the safety engineering aspects. A pamphlet devised by the American Mutual Liability Insurance Company was distributed containing a plan for the employment of disabled veterans and other handicapped persons, productively and safely. This plan consisted of the following five steps: (1) learn the medical facts (to find out what the applicant can do); (2) analyze the jobs (to find the best job for the worker); (3) match the man and the job (for maximum production and safety); (4) introduce the man to the job (to forestall misunderstanding); and (5) plan for follow-up (to insure continued success). MR. JOHNSON emphasized two points: (1) cooperation by plant personnel, physician, employment department, and others; and (2) good follow-up.

DR. WALTER S. PRIEST spoke on the subject "Penicillin Therapy."

THE *Logical Choice*

IN HEMORRHOIDAL THERAPY. . . .

STOPS HEMORRHOIDAL PAINS . . . WITHIN 5 MINUTES

FOR the relief of inflammatory rectal conditions so common with patients everywhere, RECTAL MEDICONE meets these objectives:

1. ANESTHESIA OF THE EXPOSED NERVES
2. HEMOSTASIS OF BLEEDING VEINS
3. DECONGESTION OF THE VARICOSITIES

Many thousands of physicians during the past ten years have employed RECTAL MEDICONE to relieve pain, control bleeding and reduce congestion in rectal conditions where surgery is not indicated, also in pre-surgical and post-operative treatment. Clinical experience in many hundred thousand cases proves that RECTAL MEDICONE stops hemorrhoidal pain within 5 minutes.

The wide and constantly growing employment of RECTAL MEDICONE attests most eloquently to the foremost place which it has attained in its field.

At all prescription pharmacies $1.25 per box

MEDICONE COMPANY, 225 VARICK STREET, NEW YORK 14, N.Y.

RECTAL MEDICONE

The availability of penicillin now represents an industrial triumph in the technique of mass production. Instead of being grown in bottles, as was formerly the case, penicillin is now grown in large tanks, 40,000 gallons of the mixture resulting in 15 gallons of penicillin material. Lantern slides were used to good effect, showing the manufacturing processes.

Penicillin should be preserved at a temperature of 5°C.

The drug appears rapidly in the urine and also appears in the gall-bladder.

As to administration, it cannot be given by mouth. The usual methods of administration are intramuscularly, repeated intravenous injections, and a continuous intravenous drip which is now frequently used. Intramuscular injections should be given not less than three hours apart.

A lantern slide was shown, tabulating the group of organisms against which penicillin is effective and those against which it cannot be used with success, supplemented by certain recent additions.

Penicillin has been used in surface and deep wounds successfully, and for suppurative processes in general, although surgery is still important in the latter. The dosage has varied from 1000 to 2000 units per day in different conditions, the highest dosage administered being 400,000 units a day.

An illustrative case history was presented of a compound fracture of the ankle, which caused a great deal of clinical upset, the solution being the discovery of an encapsulated abscess along the tendo Achilles, found after amputation. It is believed that penicillin might have helped in such a case.

DR. FRANCIS H. L. TAYLOR started the discussion of "Treatment of Burns."

Reports of several disasters have posed various and difficult problems with reference to biological changes during and after burns. Three phases were considered: (1) anemia; (2) nutrition (hypoproteinemia); and (3) carbohydrate metabolism.

With respect to anemia, in the 81 cases considered (of which 42 were males and 39 were females), the anemia was present in 33% and was progressive in 26%. These were cases of marked anemia and marked hemoglobinemia which occurred early after the burn and which was followed in some instances by hemoglobinuria. The blood showed a condition of pseudopods in the red cells and what were called "spherocytes." These changes were probably due to the pre-heating of the cells in the burned area. Accompanying this was a decrease in the fragility of the cells.

The only successful treatment in such cases has been multiple transfusions. Occasionally there is a rare case of intestinal hemorrhage.

With regard to nutrition and hypoproteinemia, 40 of the 81 cases showed this condition, of which 21 were profound. Large amounts of protein are excreted in the urine. In such instances, a high protein diet was forced, amino acid being given by the sternal route. Albumin and plasma were administered in cases which developed edema.

In the consideration of carbohydrate metabolism, 26 cases showed deviations from the normal, with 60% of the cases showing a hyperglycemia, which occurred after one hour from the time of the burn.

High lactic acid findings from 25 to 35 were observed, and one case which was fatal showed a value of 115.

DR. STANLEY M. LEVENSON completed the discussion on burns, especially with reference to treatment.

As an important principle in the treatment of burns, it must be decided whether the burn will heal by itself or whether excision of dead tissue and graft is needed—often such a decision cannot be made immediately on entrance to the hospital.

The disadvantages of the tannic acid treatment were mentioned, particularly with reference to the infection of eschars and the loosening of eschars with subsequent infection. Most echarotics delay healing, and in some cases liver necroses develop and the time of grafting is delayed.

Pressure dressings have in the main supplanted escharotics. Such dressings are left on from two to four weeks, as are also secondary dressings; second degree burns are usually healed and can frequently be grafted in a period of five to six weeks.

The depth of a burn is a very important factor with reference to recovery and the length of the treatment.

Burns of the hands present special problems; swelling should be minimized and infection avoided in every way possible. Casts are applied with the fingers in a neutral position (semi-cockup).

The treatment of burns of the face is extremely difficult and, after considerable experience, it has been decided to leave them alone except for the application of ointment.

DR. HOLLIS E. POTTER discussed the subject "The Wedge-Shaped Vertebra."

The wedge-shaped vertebra may be produced by injury or other factors.

In fractures the following factors are important: (1) the upper and anterior aspects of the body; (2) the preservation of the intervertebral space; (3) displacement backward; (4) impaction may also occur in the lower part of the body.

There has been a great deal of controversy about osteochondritis, which does not mean much to the patient early or late.

Faulty development of the epiphyseal plates and also other vertebral affections can be easily confused with fractures. Both of these conditions have been seen in the same person.

DR. D. B. PHEMISTER discussed "Shock and Blood and Plasma Therapy."

Surgical shock has been described as an embarrassment of the circulation resulting from an accident or operation. There is a local loss of blood or plasma or both as an actuating factor. The blood pressure drops with impairment of body function, followed by an impairment of the circulation and sometimes death.

In crushing injuries of the extremities, there is extravasation of the blood into the tissues, which may be overlooked or underestimated.

The treatment is transfusion by whatever fluid is lost; this may involve the use of blood, plasma, or saline.

A blood bank has been found to be a good arrangement for the prevention of shock after surgery, the blood being administered along with the operation when there is a great deal of blood lost; this may be estimated by weighing the soaked sponges. The average loss has been computed for some operations, for example: neurosurgery, 900 cc., and pneumonectomy 1500 cc.

The dangers of transfusion have been reduced tremendously and are now a minimum; the same principle holds for sodium-citrated blood. A series of cases was cited in which there were 5,122 transfusions given in 22 months without a single death occurring.

Plasma represents mainly a substitute for blood and is extremely useful in the treatment of burns.

The toxic theory of surgical shock is not now tenable. The blood pressure is very rarely lowered without the loss of blood. Shock is probably not produced by a reflex stimulation of the depressor nerves.

Lantern slides were used to demonstrate experimental work on animals showing that both neurogenic stimulation and loss of blood in such animals produced shock.

Clinical example were given of patients in whom shock occurred because of large incisions and previous loss of blood.

DR. O. A. SANDER presented the subject "Health Hazards of Electric Welding."

A brief review of the hazards of welding was given, including conjunctivitis, lead poisoning, and metal fume fever. There have been no reported cases of carbon monoxide, manganese, arsenic, and cadmium poisoning. Not enough nitrogen oxide gases exist in the exposure to cause injurious effects.

The irritant effects consist of cough, tightness of the chest, and bloody sputum, which have been proved to be caused by organic smoke.

The shipyard experience shows some occurrence of

Young Women in Industry

The modern woman of industry in this war period shows little resemblance to her sister of even two generations ago. Physically she is much better developed and fills many jobs which originally had been intended for men. But because of the greater energy output required by such work, nutritional adjustments are frequently required in order to prevent undue drain and resultant deficiency states.

Ovaltine presents an excellent means to bring the average daily diet to optimal nutritional levels without overburdening the digestive tract. This delicious food drink supplies in readily assimilable form the essential nutrients required. It also serves the valuable purpose of preventing or correcting the frequently encountered dietary deficiencies which are likely to lower industrial efficiency.

THE WANDER COMPANY, 360 N. MICHIGAN AVE., CHICAGO 1, ILL.

Ovaltine

Three daily servings (1 ½ oz.) of Ovaltine provide:

	Dry Ovaltine	Ovaltine with milk*		Dry Ovaltine	Ovaltine with milk*
PROTEIN	6.0 Gm.	31.2 Gm.	VITAMIN A	1500 I.U.	2953 I.U.
CARBOHYDRATE	30.0 Gm.	62.43 Gm.	VITAMIN D	405 I.U.	480 I.U.
FAT	2.8 Gm.	29.34 Gm.	THIAMINE	.9 mg.	1.296 mg.
CALCIUM	.25 Gm.	1.104 Gm.	RIBOFLAVIN	.25 mg.	1.278 mg.
PHOSPHORUS	.25 Gm.	.903 Gm.	NIACIN	5.0 mg.	7.0 mg.
IRON	10.5 mg.	11.94 mg.	COPPER	.5 mg.	.5 mg.

*Each serving made with 8 oz. of milk; based on average reported values for milk.

upper respiratory irritation, but no edema of the lungs.

Since 1935, Dr. Sander and others have been interested in the experience of welders working in confined spaces in tanks. In such an exposure, the particles are composed of 90% iron oxide material under half a micron in diameter.

A series of slides depicted x-ray findings in welders, showing discrete dense bodies similar to the nodules of silicosis. Pathological sections were also shown of the siderosis which occurs.

In differential diagnosis in ruling out silicosis, it was found that these small dense bodies are more discrete, not confluent; the hilum shadows are normal in appearance; and also there is no predisposition to tuberculosis.

The solution of this problem consists in the intelligent use and application of special exhaust ventilation.

DR. PAUL G. DICK closed the program, presenting a discussion of DR. SANDER'S paper with reference to the x-ray aspects.

The hilum shadows are differentiating, but the history is most important. Miliary tuberculosis, fungus infestation, and metastases of malignant tumors must also be considered.

A lantern slide demonstration was given of x-rays of the chest showing cases of miliary tuberculosis, ordinary pulmonary tuberculosis, and silicosis.

ACTIVITIES of STATE HEALTH DEPARTMENTS

Pennsylvania

THE BUREAU of Industrial Hygiene of the Pennsylvania Department of Health has recently completed a survey of medical facilities available in 4,637 Pennsylvania industrial plants employing 1,221,226 persons. It was found that 50 of the plants provide full-time physician service and 277 plants provide part-time physician service. The number of employees benefiting from these services, however, is 45.7% of the total number of employees in the plants surveyed.

New Jersey

HOW Should Respirators Be Handled? No one likes to use someone else's toothbrush, and no one likes to wear his buddy's dirty respirator. Personal ownership and careful cleaning are factors of human appeal. Here's a tested respirator program that will work: (1) Test the air to see if respirators are needed. (2) Supply approved respirators, and explain why they should be worn. (3) Give two to a person—while one is being cleaned, the other can be worn. (4) Mark each person's respirators—put the employee's number on each part, using a metal punch, cloth or rubber label, or paint. (5) Install a respirator cabinet—where cleaned respirators can be stored in pigeon-holes, each labeled with the worker's name. Paint the cabinet white, and keep it clean. When employees leave work for the day, have them drop their dirty respirators in a special box or basket. (6) Clean and repair respirators daily—don't rely on the individual to make his own repairs. Assign one person and train him. Set up a cleaning station with running hot and cold water, work shelf and drain board. Respirators should be cleaned after being worn one shift. (7) To clean—follow manufacturer's instructions. Remove neckbands, filters and filter holders. With brush, soap and lukewarm water, scrub the metal, plastic and rubber parts, and remove all surface dirt. Rinse. Dip in dilute formaldehyde, carbolic acid, free chlorine solution or other disinfectant. Rinse in warm water. Dry, air, reassemble, replacing worn parts and dirty filters. Place in employee's pigeon-hole in respirator cabinet—ready for use.

—From "What? When? Who? How?" by Bureau of Industrial Health, New Jersey Department of Health.

CUTTING-OIL DERMATITIS — *Take*: Five minutes' time. *Add*: A good soap. *Mix*: With plenty of warm water. *Directions*: Apply freely before lunch and before you quit work. Of all the answers to cutting-oil dermatitis, the above prescription has given the best results. Cutting oils are used to some extent in nearly all machine shops. In both the operation of the machine and the handling of the material, the operator is in contact with the oil. Not only are the hands, forearms and neck covered with the oil, but also the thighs and knees, the latter being exposed because oil is splashed or wiped on the coveralls. Oil pimples, or oil acne, occur especially with oils of the insoluble type. The worker notices small blackheads in the pores of the skin, and complains of itching, which may be intense. As the condition develops, slight elevations at the site of the blackheads appear which may grow to the size and consistency of a pea. These pimples may become infected with skin bacteria and form boils or even carbuncles. Prevention of oil pimples is far better than treatment. And the best means of prevention is *personal cleanliness*. That's the basis for the above prescription. Several plants have posted this prescription on their bulletin boards, or incorporated it in a leaflet. It catches the worker's attention—and if he follows it, he will have no trouble from oil pimples.

—*Industrial Health Bulletin*. New Jersey Department of Health, Bureau of Industrial Health.

Virginia Report

DERMATITIS—various inflammations of the skin—led the list of occupational diseases reported to the Virginia Industrial Commission during the first three months of the state's new occupational disease law, according to a report made public by the commission October 6. In all, 135 cases of diseases were reported since July 1, when the law became effective, through September 30. There were 62 cases of dermatitis, 40 of them in manufacturing industries. Other diseases reported included 15 cases of infection or inflammation, 15 of conjunctivitis, seven of poisoning, one case of radium disability and one case of silicosis. The case of silicosis was reported in a coal mine.

—*Richmond Times-Dispatch*, October 7, 1944.

Kansas

THE purpose of the Industrial Hygiene Division is to assist industry in solving all of its many health problems, such problems usually having a direct bearing on absenteeism. The various types of services which can be given industry may be quite extensive, but can be summarized as follows: (1) study of plant, with recommendations as to type of industrial hygiene program that can best be adopted; (2) survey of the industrial enviroment as to all possible health hazards, and recommendations for their elimination; (3) consultation and laboratory services in determining toxicity or other injurious effect of materials used or to be used; (4) consultation services to medical directors (or local physicians) on occupational diseases or illnesses of workers; (5) assistance in developing uniform records on absenteeism and their analysis; (6) health education programs; (7) providing special equipment and laboratory facilities in case-finding pro-

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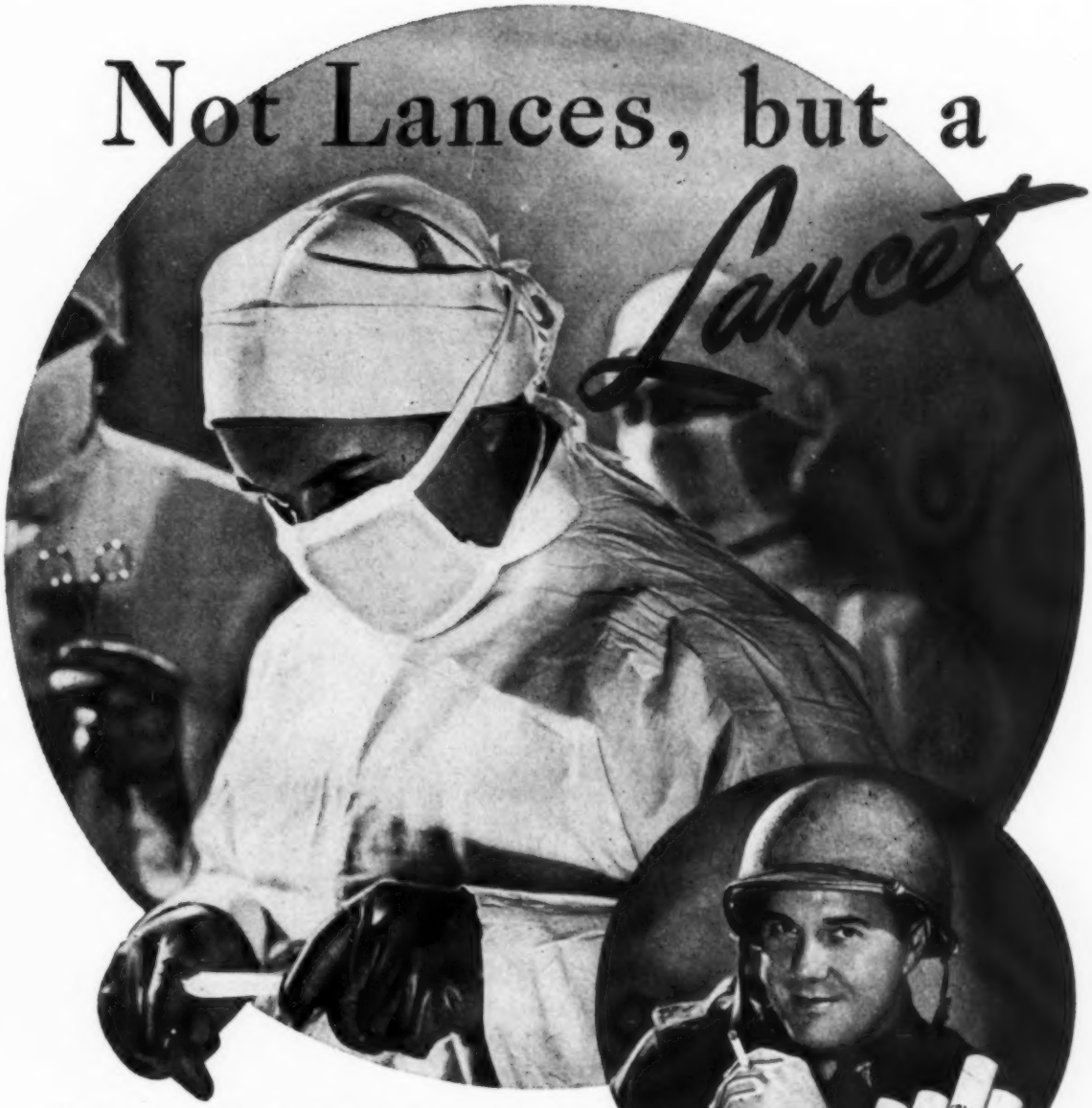
Not Lances, but a *Lancet*



HE'S a man of battle. He doesn't charge in with lance atilt—or its modern equivalent the bayonet, the Tommy gun, the Garand—but he's fighting for life, all the same. The lives of other men... and constantly at the risk of his own in those advanced dressing stations and field hospitals. Bombs lash down... shells burst... but he stays at his post.

Once in a while he has a moment to himself. A moment of relaxation... time for a cigarette... time for a Camel. With men in all the services, Camel is the favorite according to actual sales records.

COSTLIER TOBACCOS **Camels**

Reprint available on cigarette research—Archives of Otolaryngology, March, 1943, pp. 404-410. Camel Cigarettes, Medical Relations Division, One Pershing Square, New York 17, N. Y.

grams of tuberculosis and venereal diseases; (8) providing general and clinical laboratory facilities for study of special problems; (9) encouraging and promoting adult hygiene programs; (10) assistance in promoting accident prevention programs; (11) assistance in promoting nutritional and feeding programs; (12) consultation and disposal of industrial wastes, and (13) consultation on adequate, safe water supplies and on sewage disposal. During the past two years the Kansas Division of Industrial Hygiene has made 159 separate plant studies and surveys. These involved the control of hazardous working conditions in the occupational environment of approximately 110,000 workers. During the same period the division's engineer and chemist made 1,207 chemical and engineering determinations, to establish the presence or absence of toxic or hazardous substances in the industrial worker's environment. It is interesting to note that in approximately half there were found to be dangerous concentrations of hazardous substances, and in practically all such instances the recommendations of the hygiene engineer brought the hazardous conditions under control. It is also interesting that of the 115 industrial plant examinations made by the Division during the past year, 42 were initiated by the Division itself; 57 were requested by management; eight were requested by the Army; five were requested by labor unions; one was requested by the Navy; and the remaining two requests came from other sources.

—*Topeka Kansas Business*, October 1, 1944

Ready to Help

THE DETROIT Department of Health is ready to assist any physician who suspects that the illness of a patient is due to an exposure to occupational disease. The staff of the Bureau of Industrial Hygiene of this department includes a physician, engineers and chemists trained and experienced in industrial hygiene, industrial toxicology and prevention of occupational diseases. They will assist the physician by giving him specific information about the occupational hazards to which his patient is exposed. A greater exchange of information between physicians and industrial hygienists will benefit all concerned, including patients and other workers, because it will result in increased knowledge about working conditions which might cause industrial disease.

—*Detroit Medical News*, October 16, 1944.

The Mutuals

THE mutual casualty companies are greatly interested in the program of speedy rehabilitation and employment of returning veterans, especially those injured in action and permanently disabled, believing that through proper placement and considerate supervision such individuals may be happily engaged, both productively and safely. Mutual management welcomes these veterans back to industry and believes that in most instances the physical handicaps sustained by wounded servicemen need not be a deterrent in considering them for placement where they may continue as productive and self-sustaining members of society. Furthermore, mutual management denies, as is so frequently asserted, that insurance companies discourage the re-employment of permanently injured persons. Contrary to the general belief that a physically handicapped person becomes a poor risk, it is the contention of mutual executives that these individuals become better employees from the safety standpoint because, instinctively, they have become more careful as a result of their injury. Mutual companies have played a large and important part for many years in the rehabilitation of injured workmen. These individuals are now back at work with complete safety to themselves and those around them.

—From a statement by A. V. GRUHN, general manager, American Mutual Alliance.

Health of the Nation

DR. MORRIS FISHBEIN, editor of *J.A.M.A.*, speaking on a recent (September 21) coast-to-coast broadcast (Blue Network, on the McKesson & Robbins program, "Stop or Go," with Joe E. Brown) said that the death rate from pneumonia in this war is less than 1% as compared to 20% in World War I, and predicted that "miracle remedies now limited by demands of war," will be handled by "proper prescription and dispensing" to control complications that used to cause unnecessary deaths. "The pharmacist of today has had college education and special education in chemistry, pharmacology, physiology and many other basic sciences. Such great discoveries as the powerful drugs and other remedies used to control disease today demand the height of professional and technical skill for their preparation. I need only mention the marvels that have been accomplished by the sulphonamides, by penicillin, by glandular products, by vitamins, and new nutritional products. Right now some 60,000 of our country's doctors and 10,000 of our pharmacists are in the armed forces. Nevertheless, by long hours of devoted work the health of our nation has been kept at a peak even above that reached in time of peace. And I can predict with confidence that only the beginning of medicine's and pharmacy's achievements has been approached. The supplies of some of our miracle remedies have been limited by the demands of war. When peace comes we will learn what can be done by proper prescription and dispensing of these new powerful forces for the prevention of disease and for the control of some of the serious complications that used to cause unnecessary deaths. Then, we may anticipate, the death rate from mastoiditis after infection of the ear will be lowered still further. Peritonitis after abdominal operations will appear less and less frequently. Pneumonia will no longer be feared. The venereal diseases may disappear completely. Through education of the American people about personal and mental hygiene, cleanliness of the body, relaxation of the mind, good nutrition and physical fitness more and more people will live longer and more healthfully. I see a bright future for medicine and for pharmacy as two of the greatest professions that exist for the service of mankind. We must return to the high standards of pre-war years. Our schools of medicine and pharmacy must be extended and encouraged; young men and young women—of aptitude, with the proper moral standards, must be given the opportunity to qualify in these schools. Thus we will go forward to the day in our democracy when every human being may look forward at birth to the 70 years of accomplishment that are the life cycle of the healthful man."

STATEMENT of the ownership, management, circulation, etc., required by the acts of Congress of August 24, 1912, and March 3, 1933, of Industrial Medicine, published monthly at Chicago, Illinois for October 1, 1943. State of Illinois, County of Cook.—ss: Before me a notary public, in and for the state and county aforesaid, personally appeared A. D. Cloud, who, having been duly sworn according to law, deposes and says that he is the Publisher of Industrial Medicine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit: 1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, A. D. Cloud, 533 Madison Street, Glencoe, Illinois; Editor, Dr. C. O. Sappington, 330 South Wells Street, Chicago, Illinois; Managing Editor, None; Business Manager, Stephen G. Halos, 605 North Michigan Avenue, Chicago, Illinois. 2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address as well as those of each individual member, must be given) Industrial Medicine Publishing Company, 605 North Michigan Avenue, Chicago, Illinois; Charles Drueck, Jr., 58 East Washington Street, Chicago, Illinois; Stephen G. Halos, 605 North Michigan Avenue, Chicago, Illinois; A. D. Cloud, 533 Madison Street, Glencoe, Illinois. 3. That the known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state) None. 4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. 5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above is..... (This information is required from daily publications only.) A. D. Cloud, Publisher. Sworn to and subscribed before me this 21st day of September, 1944. (Seal.) Leonora E. Fladung. (My commission expires August 24, 1948.) [NOTE—This statement must be made in duplicate and both copies delivered by the publisher to the postmaster, who shall send one copy to the Third Assistant Postmaster General (Division of Classification), Washington, D.C., and retain the other in the files of the post office. The publisher must publish a copy of this statement in the second issue printed next after its filing.]

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Liquid Bulk

FACED with the problem of cleaning their enormous stockyards, the Romans constructed a magnificent channel which effectively drained the waste-laden stables.

Similarly, in the intestinal tract, there is no more efficient method of flushing away waste than by the use of *liquid bulk*—as formed by Sal Hepatica plus water.

Clinical and laboratory tests prove that:

★ in the isolated loop of a dog's ileum, a laxative solution of Sal Hepatica increased the liquid bulk by 34 per cent in one hour.

★ in thistle tube experiments, a Sal Hepatica solution increased the liquid bulk by 100 per cent within 6 to 12 hours.

★ Sal Hepatica's liquid bulk helps stimulate bowel muscles, maintain a proper water balance. And the salines of Sal Hepatica help relieve gastric acidity, help promote the flow of bile.

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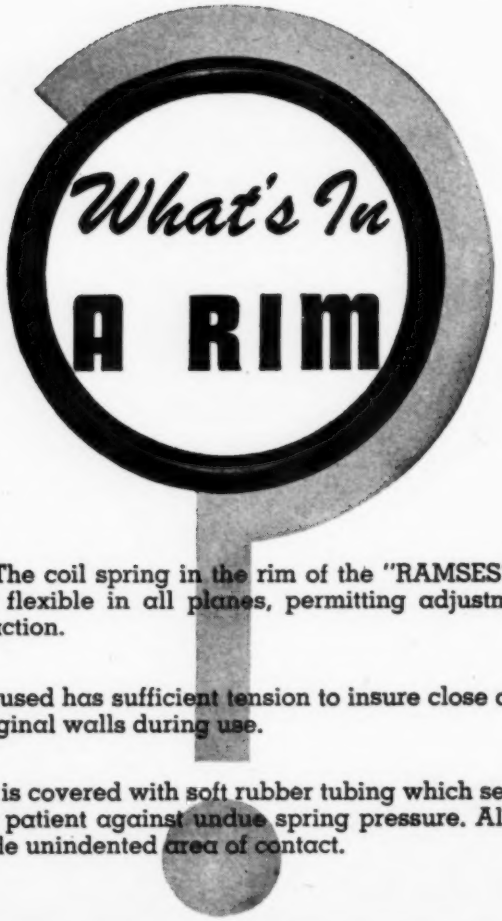
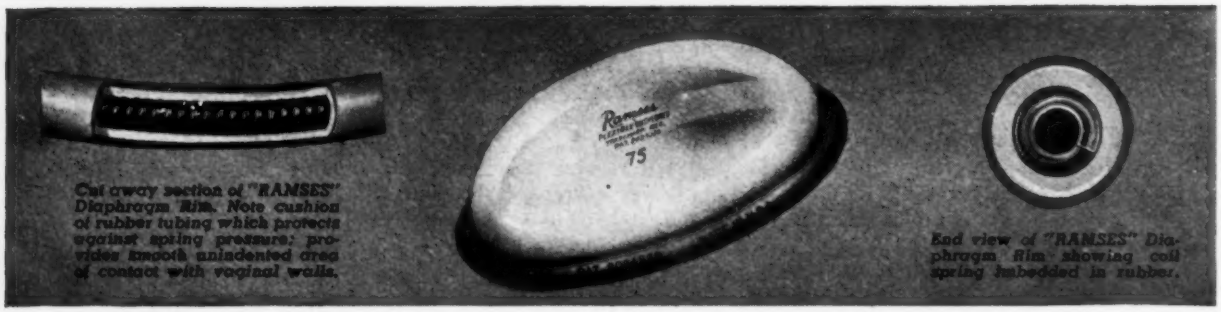
Sal Hepatica SUPPLIES Liquid Bulk!



The coil spring in the rim of the "RAMSES"* Diaphragm is flexible in all planes, permitting adjustment to muscular action.

The spring used has sufficient tension to insure close contact with the vaginal walls during use.

The spring is covered with soft rubber tubing which serves to protect the patient against undue spring pressure. Also provides a wide unindented area of contact.



Cut away section of "RAMSES" Diaphragm Rim. Note cushion of rubber tubing which protects against spring pressure; provides smooth unindented area of contact with vaginal walls.

End view of "RAMSES" Diaphragm Rim showing coil spring imbedded in rubber.

"RAMSES" Flexible Cushioned Diaphragms are supplied in sizes ranging from 50 to 95 millimeters. They are available through any recognized pharmacy. Only the "RAMSES" Diaphragm has the patented flexible cushioned rim.

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